The Electrical Industry's Weekly Magazine

January 12, 1959

Electrical World

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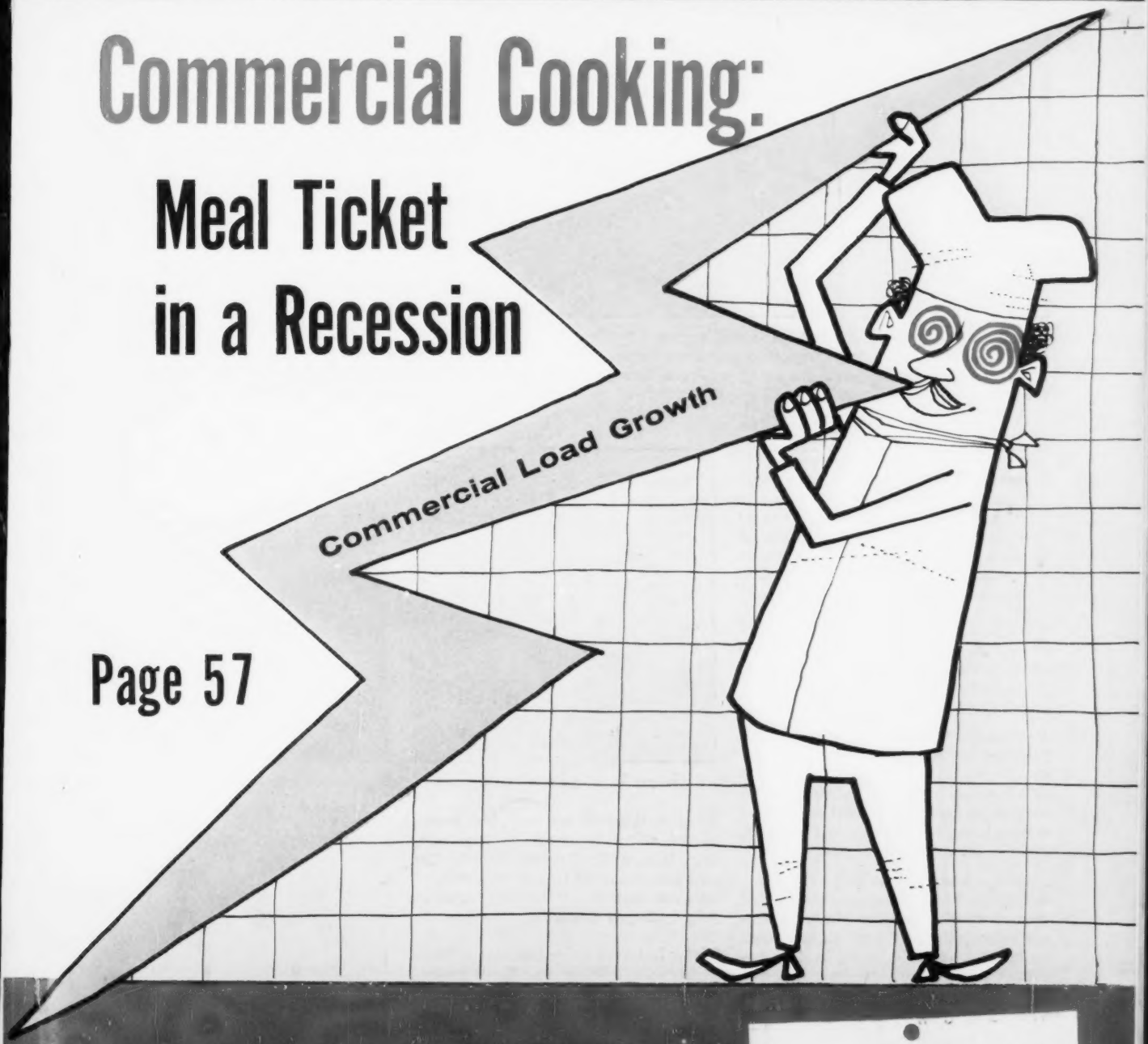
Commercial Cooking:

Meal Ticket in a Recession



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Winter Peaks Near Estimates . . . p 48

STEVENS RICE GS W
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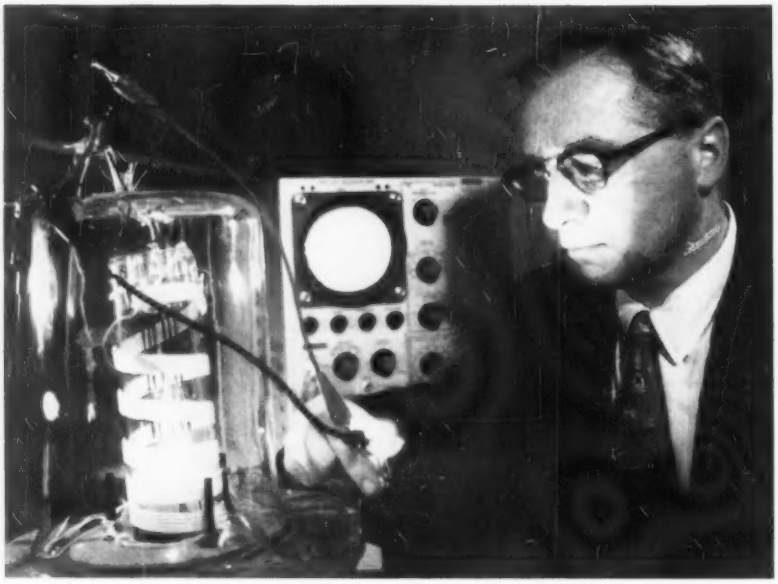
TODAY'S RESEARCH AND TOMORROW'S POWER



G.E.'S THERMIONIC CONVERTER, as a major power producer is a long way off. Pure research, however, is paying off in new ideas for improving today's generating equipment. Immediate gains are being achieved through research and development on . . .

TECHNOLOGICAL PROGRESS

General Electric's "across the board" approach to scientific research in the development of new sources of energy for generating electricity is expected to yield immediate as well as long-term improvements in power generation equipment.

TWO LONG-TERM PROSPECTS for generating electricity which appear technically and economically feasible in the years that lie ahead are—fission power and fusion power.

In addition to continued technological progress in these areas, intensive research is also being carried on to develop and utilize even more novel sources of energy—the fuel cell, direct conversion of solar energy to electricity, and the thermionic converter.

Investigations in these and other areas will undoubtedly produce unexpected payoffs which can have almost immediate application. The search for fusion power, for example, could lead to by-products in circuit technology or radiation generation long before fusion energy is harnessed for peaceful use.

SIGNIFICANT PROGRESS has already been achieved in the liquid cooling of generator stators. The nation's first large turbine-generator with water-cooled stator windings is now being manufactured by General Electric. The two generators of this cross-compound unit are each rated 265,000-kva at 30 psig hydrogen pressure.

. . . longer last-stage buckets

Water has over twice the heat removal ability of oil. Its use as a liquid coolant will help to open up avenues for: 1) the building of generators of up to one million kva capacity while retaining the basic design simplicity of conventionally-cooled units, 2) significant savings in power plant construction costs, and 3) overcoming the limitations on higher generator ratings imposed by current shipping restrictions.

BENEFITS TO ELECTRIC UTILITIES—By searching for new knowledge and capitalizing on existing technological opportunities, General Electric is striving for turbine-generator advances that will continue to result in low operating costs per kilowatt-hour of electricity produced. Exploring all possible avenues for technical innovations and product improvements also helps electric utilities to satisfy their needs for increased power capacity. Also, these General Electric research programs mean added value-in-use for G-E steam turbine-generators operated by electric utilities.

FOR MORE INFORMATION on today's research and tomorrow's power at General Electric, contact your local G-E Apparatus Sales Office or write for Bulletin GP-81, General Electric Company, Section 301-388, Schenectady 5, N. Y.

MORE POWER TO AMERICA

GENERAL ELECTRIC

. . . new liquid cooling techniques

. . . and increasing the capacity of steam turbine-generators.

Electrical World

Vol. 151, No. 2 JANUARY 12, 1959

Published for 85 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

In This Week's Issue

CURRENT EVENTS

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Reports from broad segment of industry indicate most daily peaks came early in Christmas week.....p 48

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Theodore A. Leeds, Electro Metallurgical Co

Changeover includes 160-Mw substation, installation of 12-kv switchgear and transformers, furnace conversions...p 52

SYSTEM ENGINEERING

Computer Optimizes Bus Design

C. A. Imburgia, H. K. Amchin, S. G. Vassiliev, American Electric Power Service Corp

Best of designs for generator or substations bus structures are selected by IBM 650 computer.....p 56

Special Report

4th Commercial Cooking Survey

Commercial cooking load grows 592,800 kw in 18-month period bringing an average yearly revenue of $9.5 million. Proves to be good load sustainer even during business slump .....p 57

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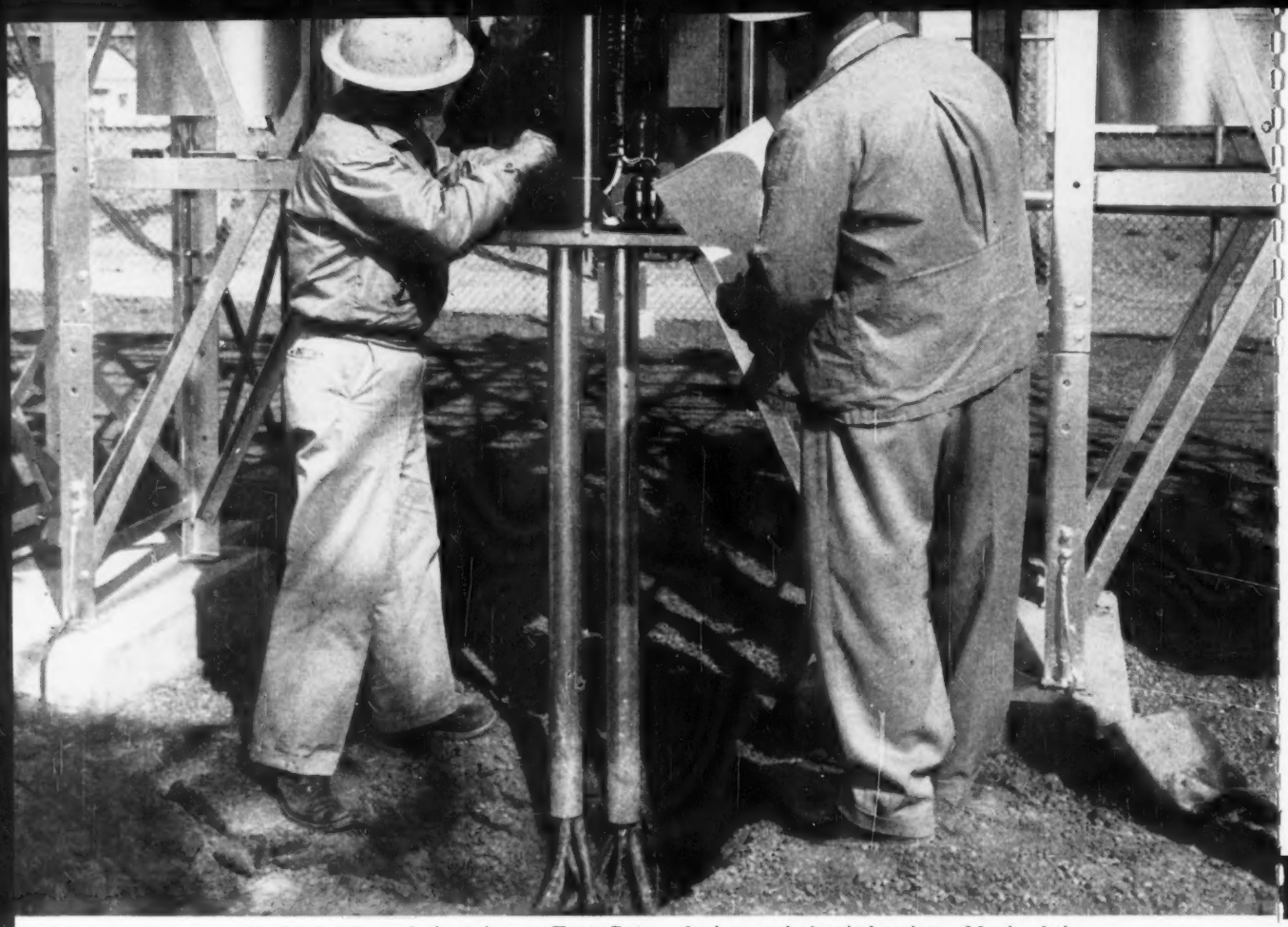


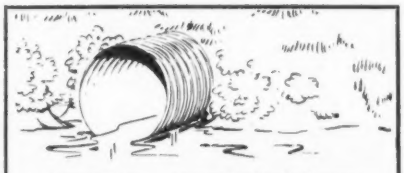
In Idaho Power's brand new East Gate Substation at Twin Falls, Idaho, CM-OT control cable is used on control circuits involving transformers, regulators, metering devices and circuit breakers. Much of the equipment is located in the yard, with cables going underground and up into the main control board.

"We expect 30 years' service from this direct-burial cable," says Idaho Power Company

On its substations along the Snake River, Idaho Power Company uses a direct-burial cable that eliminates the need for conduit or pipes . . . provides complete resistance to soil alkalinity, severe temperature fluctuations and active rodents, as well as excellent mechanical protection.

It's Okonite's Watertite-Okoprene control cable with CM-OT* finish—a lightweight, flexible cable of great compressive strength. Heart of CM-OT construction is a corrugated bronze tape that gives unusually high compressive strength. The corrugated tape is bonded to a tough wall of Okoprene, reinforced by an Okoprene-filled tape overall. This composite covering provides a permanent barrier against rodents, moisture, soil alkalies, acids, oils, sunlight or mechanical damage.

It will pay you to learn more about CM-OT quality cable constructions with corrugated bronze tape protection. Send for Bulletin EW-1121, The Okonite Company, Passaic, New Jersey.



Corrugation = strength plus lightness

Just as corrugated construction adds strength to underground pipes, so corrugation of shielding tape permits the construction of CM-OT—the stronger, lighter, more flexible and more easily handled cable.

* Patent No. 2722562

where there's electrical power . . . there's **OKONITE CABLE**

6201

Politics and Public Power

During 1958 Electrical World carried roughly 200 pages of editorial material covering the political activities of city, state and federal governments and related activities of organizations and politicians in the field of the promotion of or resistance to the public power movement. Right now we predict that the activity in both the political and public power areas of activity, affecting electric utilities, will be headline items for most of 1959.

To serve our readers' interests in this field, Electrical World will continue to be on top of the news each week, reporting and interpreting the events in the political centers of the country. And as an additional service we are carrying a special report on this subject this week and each week in the front yellow insert called the "Electrical Week."

To make room for this interpretive report on politics and public power, we are reducing the summary of each week's issue from two pages to one page. To summarize an issue of Electrical World in this space will provide a new challenge to our editors but better service to you.

We hope this additional service will make your 1959 reading more helpful and enjoyable.

Fischer Black

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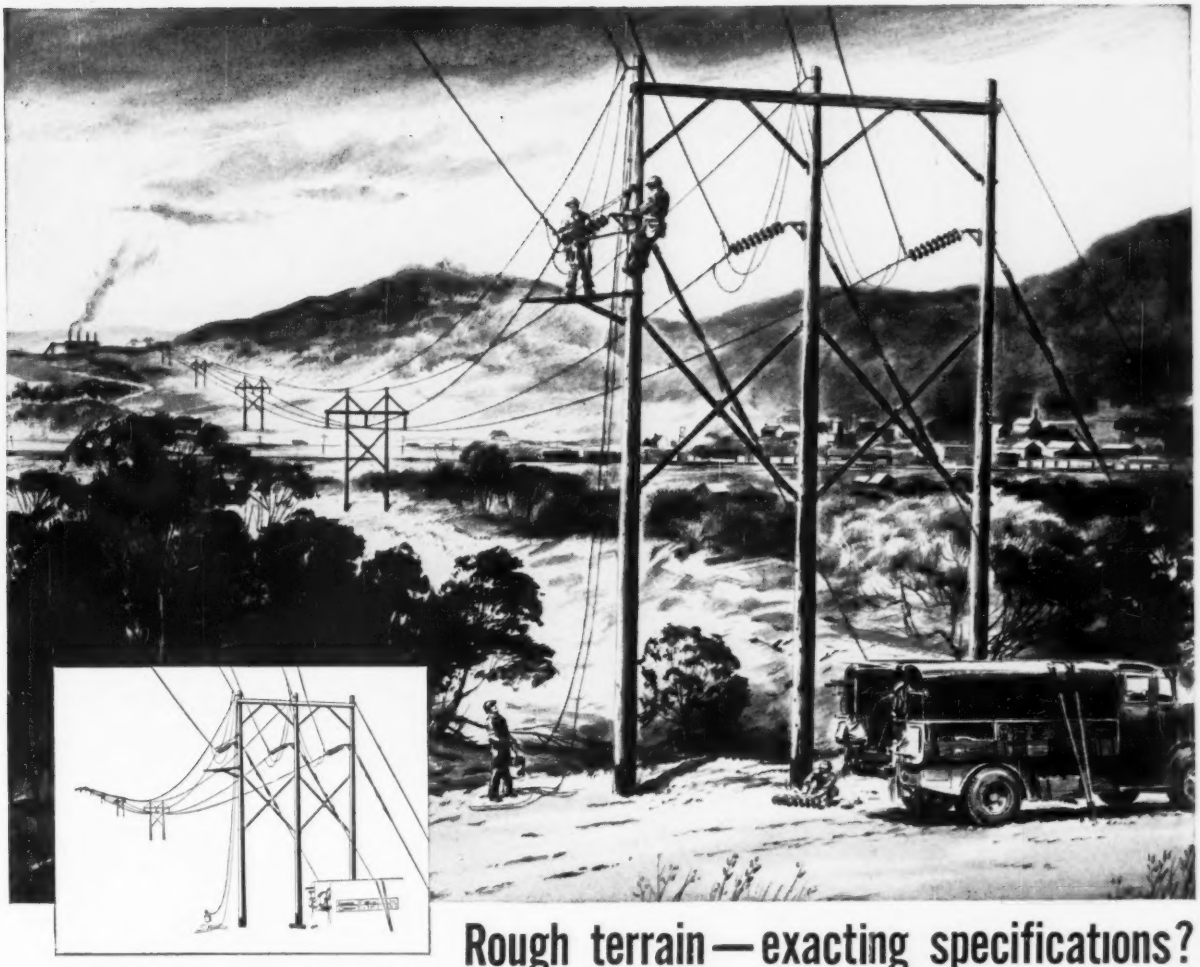

Rough terrain—exacting specifications?

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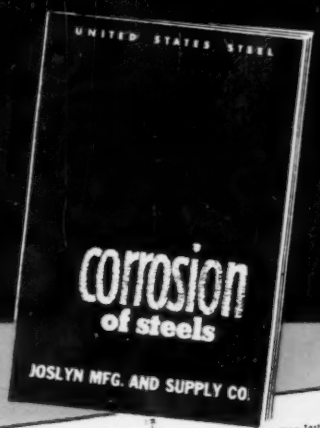

"If copper steel is defined as containing at least 0.20 percent copper, we may state conservatively that a copper steel is roughly twice as resistant to the atmosphere as a low-copper, plain-carbon steel; this advantage is more evident in an industrial atmosphere on account of the relatively high corrosion rate of low-copper, plain-carbon steels." (A quotation from United States Steel booklet.)

"Through more than three decades since it was first manufactured by Inland, Inland Copper-Alloy Steel has been giving long and satisfactory service. Also, government bureaus, engineering association and private laboratories have conducted numerous tests of the corrosion resisting properties of steel alloyed with copper. These tests have established the marked superiority of copper-bearing steel in resisting corrosion in different types of atmospheres." (A quotation from Inland Steel booklet.)

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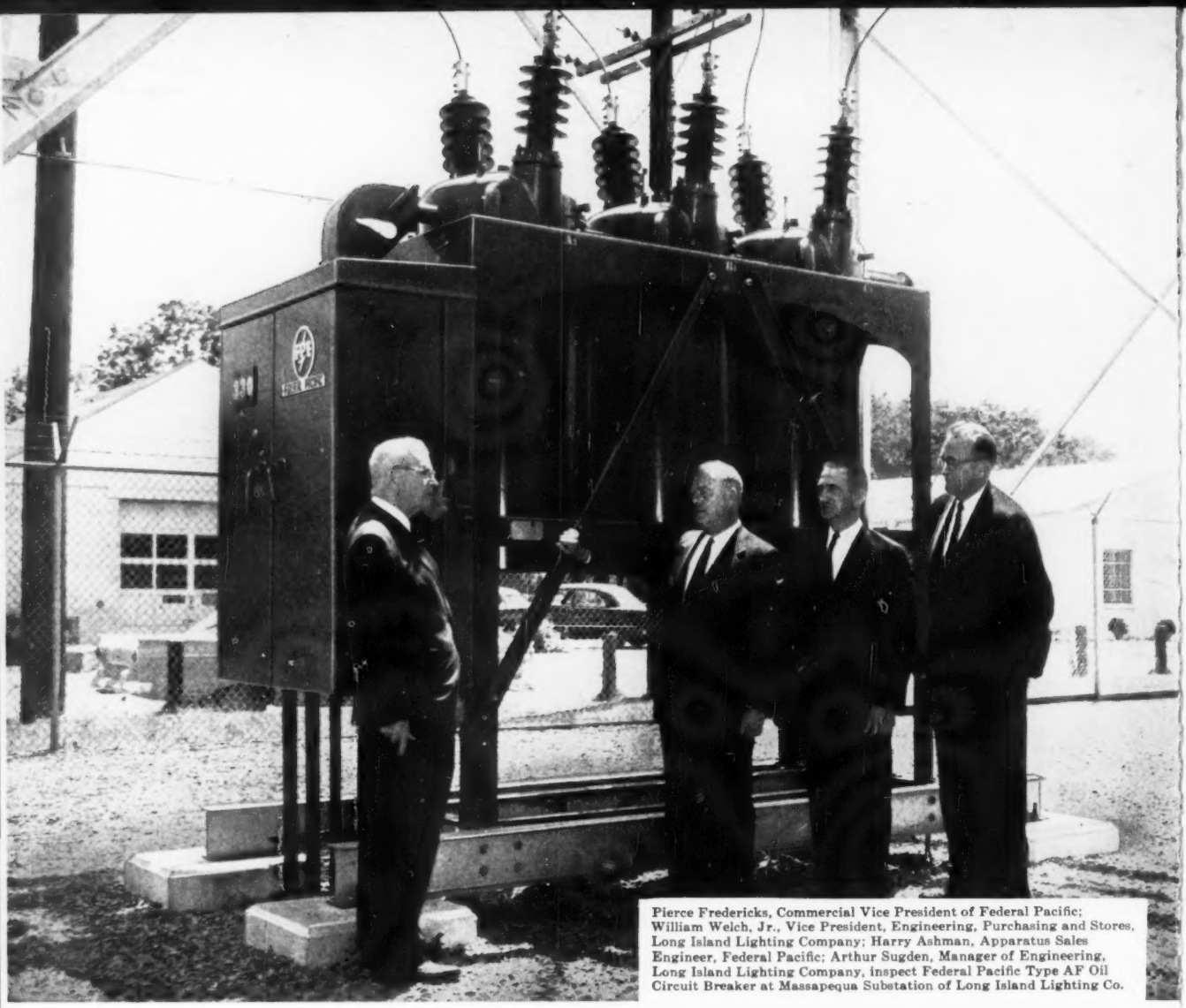

Pierce Fredericks, Commercial Vice President of Federal Pacific; William Welch, Jr., Vice President, Engineering, Purchasing and Stores, Long Island Lighting Company; Harry Ashman, Apparatus Sales Engineer, Federal Pacific; Arthur Sugden, Manager of Engineering, Long Island Lighting Company, inspect Federal Pacific Type AF Oil Circuit Breaker at Massapequa Substation of Long Island Lighting Co.

ANOTHER NEW FEDERAL PACIFIC OIL CIRCUIT BREAKER ON THE JOB

This new 34.5 kv type AF oil circuit breaker is one of many Federal Pacific breakers used by the Long Island Lighting Company. Employed as a line breaker on a sub-transmission line, this type AF breaker—like all Federal Pacific equipment—is ready to perform as specified.

Here are some of the advantages utilities gain by specifying Federal Pacific type AF oil circuit breakers:

RAPID ARC EXTINCTION—extreme simplicity of interrupters...*no* moving parts...superior condensation-type arc extinction principle. Oil injection into the hot gas bubble accelerates condensation and cooling...results in high dielectric recovery rate...prevents arc re-ignition at proper gap distance with minimum pressure build-up and erosion.

TYPE OA HYDRAULIC OPERATING MECHANISM—ultra-rapid response, 100% trip-free under *all* conditions, safe and proven dependable.

HIGHEST MECHANICAL SAFETY FACTOR—demonstrated by an ability to withstand an indefinite number of no-load operations without oil in the tanks. Uses no dash-pots in the tanks.

RIGID FRAME DESIGN—functionally designed frame provides trim lines with exceptionally strong joint construction. Oil gauges and position indicators clearly visible from ground level.

LOW MAINTENANCE COSTS—factors such as the extremely simple method of interruption, the precise positioning of contacts, the overall "built-in" simplicity, result in outstandingly low maintenance needs.

For full details of the many advantages offered by Federal Pacific type AF oil circuit breakers, call your Federal Pacific engineer or write Federal Pacific Electric Company, 50 Paris Street, Newark 1, New Jersey.

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The Electrical Week

FUTURE NEWS ▶ **Watch for sharp Democratic reaction** to Administration's budget request for atomic power development.

LATE NEWS ▶ **Appellate Court revokes Indiana PSC order on federal loans.** PSC's power over co-ops do not include sources of borrowed funds, court says. Decision clears one obstacle to $42-million steam plant that Hoosier co-op syndicate hopes to build.

Air Pollution Board turns down proposal for costly sulphur dioxide control in Louisville, Ky.

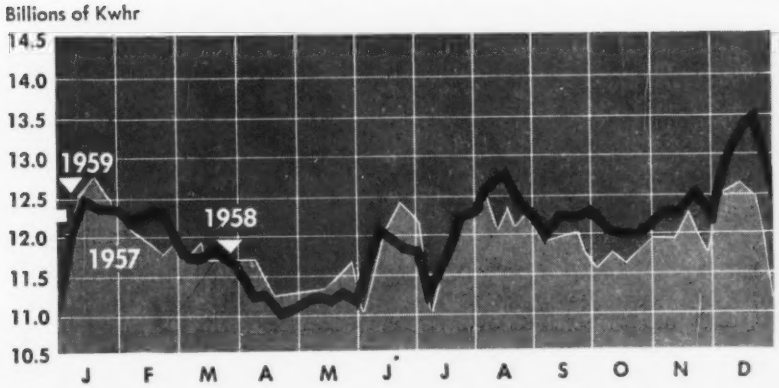
Tighter control on hydro dam licenses and amortization reserves is recommended in House Legislative Oversight Committee report. Proposed changes in Federal Power Act are almost carbon copies of FCC Chairman Kuykendall's suggestions (EW, Dec. 1, p 69).

Maine PUC grants Bangor Hydro $365,385 rate hike, advises company to use "accelerated depreciation." PUC chairman objects; says it's up to management . . . Pacific P&L asks Oregon PUC for $3,969,000 rate increase; asks Washington PSC for $995,000 a year.

First National Youth Conference on Atom will be held in Atlantic City, April 30-May 1. For info, write Electric Companies Public Information Program, 2 West 45th Street, New York City.

Management changes . . . G. O. Hylander to president of Ebasco International, succeeding Henry Sargent who becomes chairman; E. D. Early to vp-operational services at Southern Services; Ray Morton to acting president of Memphis LG&W; E. J. Surowiec to chief engineer of Central Maine Power; H. S. Kaltenborn to vp and assistant to president and Dr. S. W. Herwald vp-research both of Westinghouse; R. C. Kirk to vp-research and engineering Line Material, and W. F. Wheeler to executive vp of American Chain & Cable.

POWER OUTPUT—UP 5.7% (Week ending Jan. 3), Kwhr 12,364,000,000



Per Cent Change From Previous Year

	Dec. 20	Dec. 27	Jan. 3
Total U. S.	+9.0	+10.3	+5.7
New Eng.	+11.4	+12.1	+8.9
Mid. Atlantic	+7.9	+9.9	+5.1
Cent. Ind.	+9.9	+11.9	+8.2
West Cent.	+10.0	+12.2	+6.8
Southeast	+10.2	+10.0	+1.6
South Cent.	+6.5	+9.6	+8.3
Rocky Mount.	+7.6	+7.8	+6.3
Pacific			
NW	+7.0	+8.3	+3.4
SW	+7.9	+8.5	+8.6

Seasonally Adjusted Index 239.9

Week Ago 244.8 Year Ago 227.3

Source: Edison Electric Institute

Preview of this Issue

EVENTS ▶ **Winter peak loads were up 4.4% over a year ago.** Most companies were within 2% of estimates **(p 48)** . . . TVA's annual report for fiscal '58 shows general decline in power sales, revenues yet points to "channels of potential development not fully envisioned by the founders . . ." Meanwhile, an economist says TVA power costs would be a third higher than neighboring companies if normal expenses were factored in **(p 49)**.

SPECIAL REPORT: COMMERCIAL COOKING ▶ **Recession or not, commercial cooking is a good load builder.** This is shown in Hotpoint Co's fourth survey. Seventy companies added 395,395 kw in 1957 and 197,421 kw in first six months of 1958. Average per utility in '57 was 5,648 kw. Total EAR was $9,217,151 for '57; $4,884,074 for Jan.-June, 1958 **(p 57)**.

MANAGEMENT ▶ **The great debate on liberalized depreciation rages on** in hearing rooms of California PUC. Here are excerpts from testimony, of interest to utility management from coast to coast **(p 91)**.

ENGINEERING ▶ **Conversion of Electro Metallurgical 175-Mw load** from 25 to 60-cps supply involves new substation, 12-kv switchgear, secondary transformers, adaptation of furnaces, some 60,000 kvar of manually

Politics and Public Power

Federal power policies will be a major battleground in the new Congress, which met last week with the greatest Democratic majorities since the late 1930's.

There is hardly an area of Democratic interest that does not, in one way or another, involve the electric utility industry and its public power competitors.

The new Democrats from the western reclamation states have ambitious ideas about further development—ranging in scope from the Neuberger Columbia River Development Corp scheme, to another round of fighting over the Middle Snake River, to federal harnessing of the falling water at California's Trinity River Dam.

The dominance of the TVA bloc in the Senate will exert renewed pressure to get Congressional approval of self financing to let TVA expand with its own resources.

REA forces—Democratic and Republican— will fight Administration efforts to raise the 2% interest rate on loans, will oppose private financing of co-op projects.

The atom will be a part of a fight—with Democrats pushing for federal construction programs.

The most serious conflicts will involve the REA and the Middle Snake River. The Administration is trying again to bring co-op loan policies into some relationship with the price other people have to pay for money, including the Treasury Dept's own borrowings. But the 2% rate has become sacrosanct with the co-op lobby.

Take note of the fact that Sen George Aiken (R-Vt.) the leader of the so-called modern Republican bloc, declined to run for floor leadership because, as he put it, "I want to fight the Administration on the REA issue,

switched static capacitors (p 52) . . . Stainless steel hardware prolongs insulator life in railroad tunnel (p 55) . . . Digital computer selects American Electric Power bus design in 1% of time of man using hand methods for calculating short-circuit stresses (p 56).

METHODS ▶ **On-the-spot maintenance tests of substation gear** is done by PSCo of Colorado with tightly designed 10-ft panel truck (p 63).

SELLING ▶ **Six industry groups,** three manufacturers have teamed on Eye-Fi promotion under direction of National Lighting Bureau (p 75).

MANUFACTURERS ▶ **Gas-insulated transformer that tops previous capacities** has been shipped by GE. The unit is rated 10,000 kva, 69-12.4 kv; features safety, less weight, easier blower motor inspection (p 76).

NEW EQUIPMENT ▶ **Post insulators that attach horizontally** to poles come in ratings of 35, 45, 55, 66, and 88 kv . . . Five hardware designs are available for spaced aerial cable clamps (p 84).

PEOPLE ▶ **Shifts at American Electric Power** find Paul W. Emler upped to commercial vp. John H. K. Shannahan becomes his assistant (p 97).

and so should not be the party spokesman on the Senate floor."

The development of the Snake River is pinned on all sides by politics. The Administration is somewhat divided, with Corps of Engineers and the Bureau of Reclamation differing on the Mountain Sheep and Pleasant Valley sites.

The Pacific Northwest Power Co is before the Federal Power Commission with its proposal, and the Rep Gracie Pfost-Sen Wayne Morse bloc in Congress will renew demands for a high Hells Canyon Dam, a perennial from the public power side. Whether a stalemate is reached, and it probably will be, the fact remains that the political fight may delay development in the area.

California's cave-in to the Democrats in November poses a threat to Pacific Gas & Electric Co's proposal to develop the falling water at Trinity Dam. The Interior Dept last year favored PG&E's plan as part of the Eisenhower partnership policy.

But the election of Democrat Clare Engle to the Senate, and the sweep by Democrats across the state strongly indicate that Congress will vote money for Reclamation Bureau development.

So, the year is going to be tough in Washington. Words will be harsh and public power forces will push for gains, despite testimony from private utilities that they aren't sitting idly by in meeting the need for new energy for industry and the citizens, but rather are expanding faster than any other group in the economy. The story the private utilities have to tell is a big and good one—but may be hard to hear in a Washington full of the noise of public power groups.

It is the obligation of government to move forward more vigorously in the nuclear reactor field until such time as technological obstacles are overcome. We cannot expect private enterprise to take the lead until such time as there is a reasonable expectation of profit from nuclear reactor operation. I expect to continue to press vigorously during the next session of Congress for an acceleration of our reactor program. **Sen. Albert Gore (D-Tenn.), American Municipal Assn meeting, Boston, December, 1958.**

TECHNICAL NOTES

Aluminum transmission towers first will be justified where transportation costs are appreciable or where maintenance costs due to contamination are high.

Most changes for the advanced gas-cooled reactor will lower capital costs per kw, but will involve fuel enrichment. This will bring higher capital costs for an initial fuel charge and higher operating costs. Paper studies only roughly indicate the economic balance between these conflicting forces.

Inclusion of mutual inductance of transmission lines in analog computer studies of system transient response should be considered carefully. Mutual inductance of some line configurations can be important in determining line surge impedance.

FROM EDITORS IN THE FIELD

Light blue is the new color chosen for Cincinnati Gas & Electric's company cars to promote safety and cleanliness. The light color is more easily seen at night, shows less dirt than darker colors, enhances resale by making cars look newer, and will not be confused with colors of other fleets.

Capacitors protect equipment from lightning and power surges on Duke Power Co system. Two installations paralleled by arresters have been made on both 44 and 100-kv radial circuits, where maximum voltage rises occur.

Pushbutton testing of supervisory channels is being developed by a utility in the Southeast. A control console will have pushbuttons for controlled equipment such as breakers or regulators. A master button will test each piece of equipment in sequence.

North and south business sections of Mishawaka, Ind., are lighted by 94 L-M V-type fluorescent units (188 luminaires), mounted on 30-foot aluminum poles which are staggered at 70-foot spacing. Each of the two 4-foot luminaires in the V has two 100-watt lamps, providing approximately 24,000 lumens per pole. Units were supplied by Englewood Electric Supply of South Bend. Installation was by the Mishawaka Electric Department under the direction of Superintendent Austin R. Klien, with the cooperation of L-M's Field Engineer C. W. Puent. Note the even, diffused lighting.

L-M V-Type Fluorescents Turn Night Into Day At Mishawaka

The L-M V-type luminaires used in Mishawaka and many other cities in the country are an outstanding development in outdoor lighting equipment. These V-type units consist of two luminaires mounted at a 45-degree angle to each other. Each luminaire contains two 4-foot 100-watt fluorescent lamps. This gives maximum utilization of the light output.

The design of the luminaires, plus the 30-foot mounting height and 70-foot staggered spacing, results in exceptionally even light distribution.

Referring to the installation, Mayor Albert L. Doyle said: "The installation of our revolutionary fluorescent lighting system is heralded by enthusiastic and universal acclaim by all of our citizens and, most particularly, by our merchants, who honestly feel that a long-awaited improvement has been most satisfactorily completed."

What Do You Want To Light?

Tell us your problem; L-M lighting engineers will help you solve it—whether it's a street, a parking area, a subdivision, or an airport. L-M makes equipment for all, and L-M engineers will design the system you need, and provide complete plans and a bill of materials. For information and bulletins, ask the L-M Field Engineer or Lighting Engineer in your area; or write Lighting Division, Line Material Industries, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.

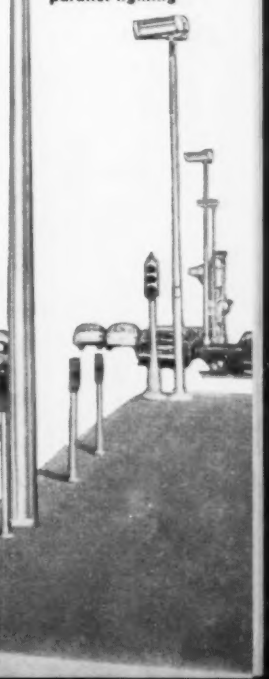
V-type fluorescent

Shallow design, for wide spread

Deep design, for more concentrated light

Delta type, for parking areas, shopping centers

Floodlight type, for parallel lighting



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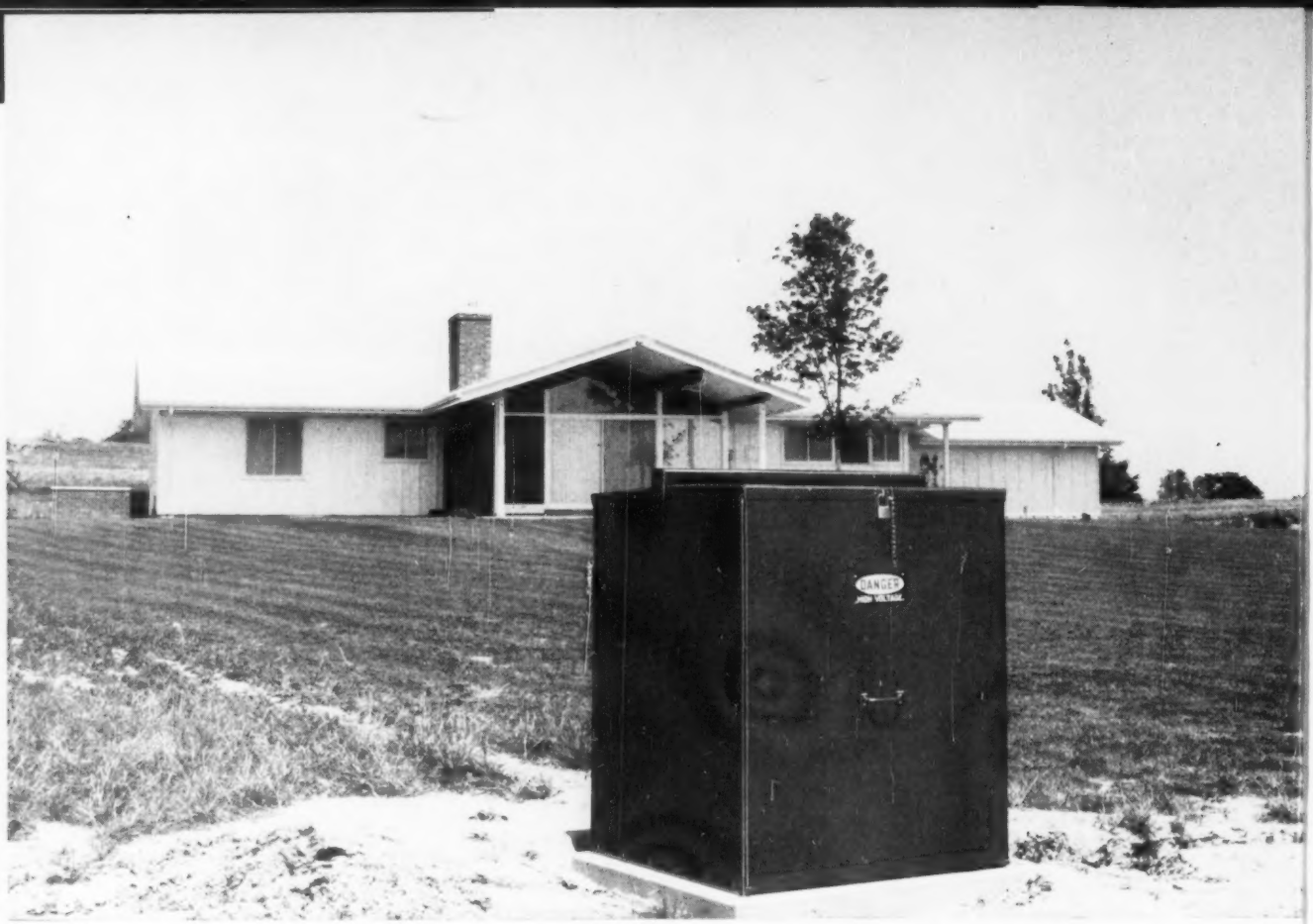
LINE MATERIAL Industries

McGRAW-EDISON COMPANY

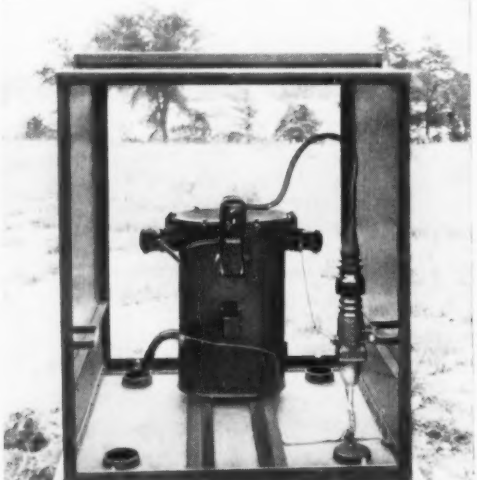
Outdoor Lighting

McGRAW EDISON

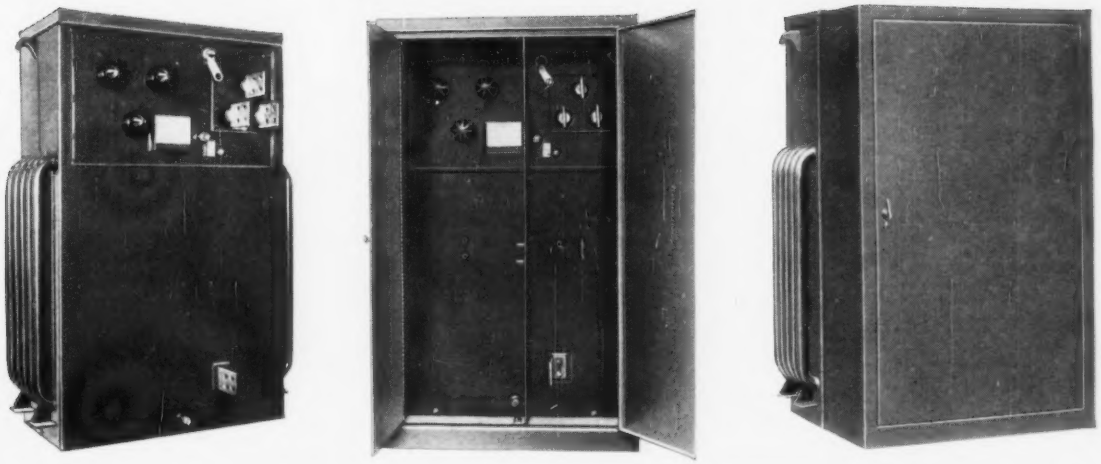


L-M TRANSFORMER ENCLOSURE, installed, on a concrete pad, prior to planting with shrubbery, which can hide the unit completely. This enclosure contains a standard pole-type 15 kva Round-Wound® transformer, cutouts, and accessory equipment. Covered opening at top provides chimney action ventilation. Enclosure is 12-gauge steel, painted with zinc-rich coating and weatherproof finish coat. It comes knocked down, is bolted together on the job site. Unit shown is a 5 kv enclosure which takes a maximum transformer size of 50 kva.

TRANSFORMER ENCLOSURE, which has just been assembled on the job site, being mounted on concrete pad, which is provided with openings for leads from the direct burial primary cable and secondary. The enclosure is bolted down to the pad with tamper-proof bolts inside the housing. Both front and back panels are removable, and are provided with hasps and staples for padlocks.



L-M ENCLOSURE with pothead from primary cable, fuse cutout, and pole-type transformer in position. Arrangements can be made for mounting cutouts, arresters, reclosers, sectionalizers, switches, secondary service meters. This type of construction lends itself to low-cost underground construction and meets the requirements of subdivisions, and other locations where pole lines are prohibited.



Left, L-M PAD-MOUNTED TRANSFORMER; center, transformer with enclosure bolted on the front. Right, enclosure closed with place for padlock below door handle. Note, at left, that fins between tubes and tanks prevent use of tubes to tie fence or aerial guys. Center view shows separate door for the high voltage compartment on the left side and barrier plate between high and low-voltage compartments.

Mounting pads are provided inside the compartment for accessory and protective equipment, and for secondary service meters if desired. Complete welded construction; no loose panels; weatherproof finish. Each compartment takes three sizes of transformers so transformer size may be increased without changing secondary wiring.

These transformers are available in single-phase from 25 to 167 kva, 12470 GrY/7200 volts—240/120 volts; and in three-phase L-M Uni-Wound design from 75 to 500 kva, 12,000 volts delta.

L-M Announces New Surface-Mounted Transformer Units For Underground

Line Material, a leader in research and development of equipment for underground distribution, produces a new pad-mounted transformer and an enclosure, both for above-ground installation.

Utility companies are facing growing demands for underground construction. Conventional type underground is costly. L-M's new pad-mounted transformer, and a transformer enclosure for a pole-type transformer, bridge the gap between overhead and full subway construction. These units may be used with full or partial conduit installations or with direct-burial cable.

Appearance With Economy

When planted with shrubbery around them, both the transformer and the enclosure make a great contribution toward solving the appearance problem, and still providing required safety, convenience, and accessibility.

L-M engineers are constantly studying underground distribution, are working with utilities to help solve their problems. The items shown here are just two of many L-M developments. Many others are in production or on the boards. If you have ideas or problems, let's talk them over—perhaps we have something that's exactly what you need.

Pad-Mounted Transformers

The transformer is a full-output L-M Round Wound transformer with a locked, tamperproof cabinet fastened to the transformer tank. This cabinet covers live parts and provides space for protective and accessory equipment and service meters. A separate inner door locks the high-voltage connections. This transformer is available in several sizes, in single and 3-phase units. (See photo caption above.)

Transformer Enclosure

The housing is heavy sheet steel to be mounted on a pad, and designed to hold a conventional pole-type transformer and protective equipment. Arrangements can be made for mounting meters, and for telephone service equipment. The enclosure comes knocked down, is bolted together at the job site—which makes it very convenient to handle. Shielded opening at top provides chimney-action ventilation. Several of these enclosures may be grouped, to hold several transformers or additional accessory equipment.

Get Complete Data

For literature on pad-mounted transformer and transformer enclosures, contact your L-M Field Engineer; or write Line Material Industries, Milwaukee 1, Wisconsin.

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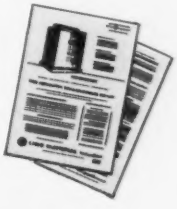


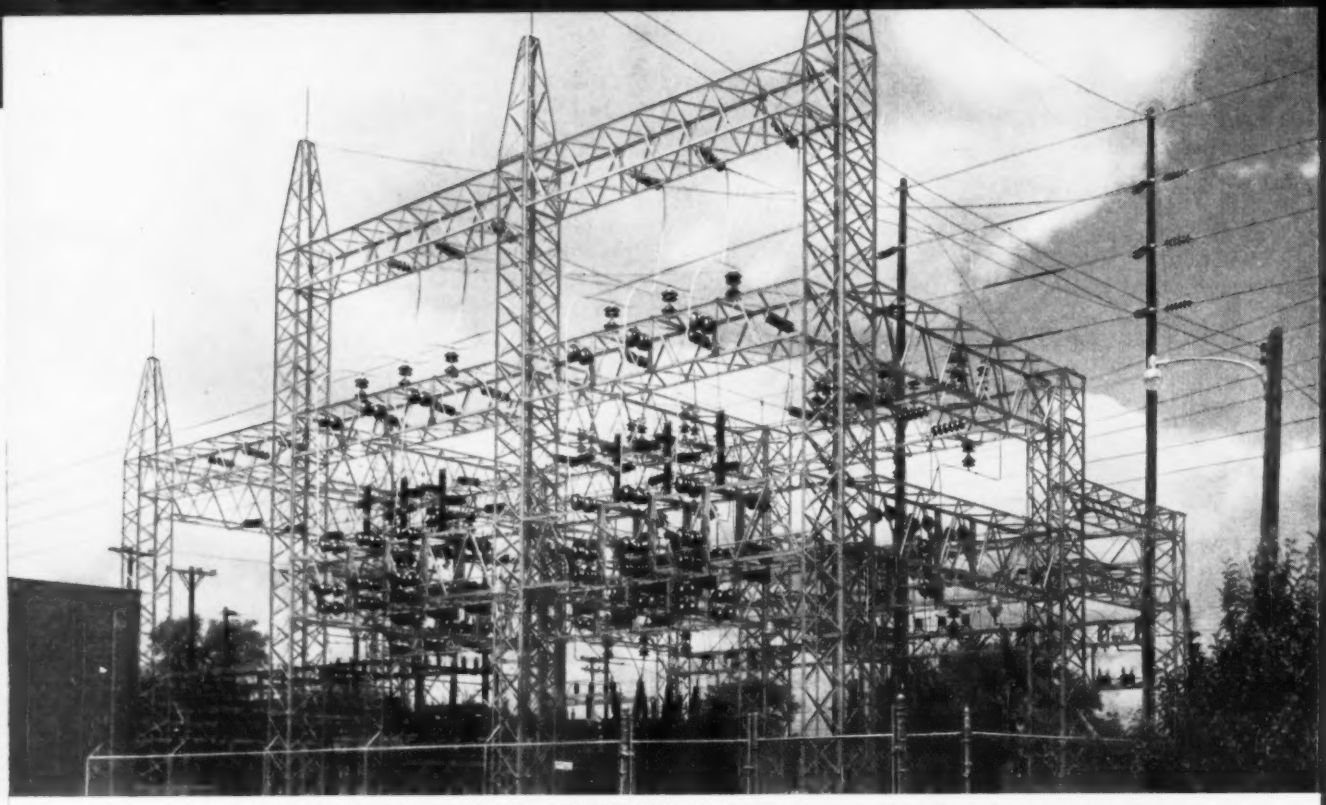
LINE MATERIAL Industries

McGRAW-EDISON COMPANY

Transformers

McGRAW EDISON

DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING • LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE AND CONDUIT



LARGE URBAN-TYPE L-M PACKAGED SUBSTATION, designed by Line Material and erected in minimum time with L-M prefabricated steel. Incoming lines are 69 kv; outgoing are 7.2/12.47 kv. L-M engineers design these packaged stations in sizes from 5 to 161 kv, for industrial plants, and for rural and urban locations on utility company lines—all with completely coordinated plans, structure, and equipment.

L-M-Engineered Packaged Substations Save Planning and Construction Time

by **W. V. SWAN,** Product Manager
Substations and Power Switching Equipment
Line Material Industries

Line Material packaged substations offer wide choice of design and application; considerable flexibility and provision for future expansion; great savings in engineering and ordering for utilities. And, because of L-M's unique prefabricated steel structure, these substations are fast and easy to erect.

One Order Does It!

Completely coordinated L-M substations need only one order; are delivered either as one shipment or coordinated to your construction schedule. It's easy to order an L-M substation. Just give us a one-line diagram of what you want—or tell us your voltage, kva requirements, number of incoming lines and outgoing feeders, and area available—and we'll design your substation for you!

Fast Erection

L-M's pre-engineered steel trusses and columns are completely prefabricated, and shipped knocked down or factory-assembled. Structures are steel, or aluminum alloy. Members have round holes punched at 3-inch intervals (before galvanizing) with square holes every foot. This eliminates measuring and drilling, and damage to galvanizing. Holes accommodate all bolts for lacing members and apparatus. That's why they go up so fast.

Prompt Shipment

Structural steel can be shipped in 3 to 4 weeks after final approval of order; complete stations in 4 to 12 weeks. Station design provides for easy, safe accessibility to all equipment. Stations meet NEMA, ASA and AIEE standards.

Ask the L-M Field Engineer for complete information and bulletins; or write Line Material Industries, Substation Department, Milwaukee 1, Wisconsin.

LINE MATERIAL Industries
McGRAW-EDISON COMPANY

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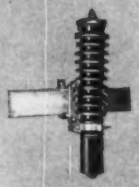
Packaged Substations

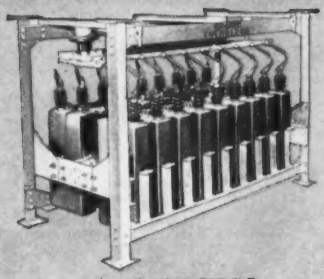
McGRAW EDISON

DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING • LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE AND CONDUIT

the Most Complete Line of Equipment for 20/34.5 kv Distribution

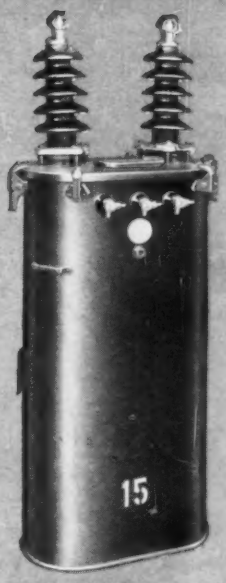


L-M'S 27 KV TYPE SS distribution valve type arrester provides low-cost protection for 150 kv BIL apparatus.

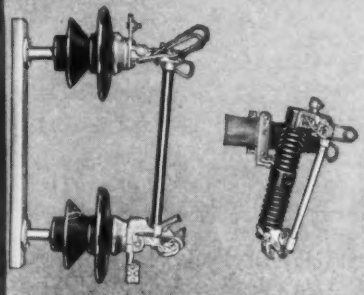


CAPACITOR EQUIPMENTS, blocks and banks to any size.

KYLE TYPE E RECLOSER, 23 kv, 150 kv BIL, in standard ratings, for single-phase extensions of the 20/34.5 system where the potential across the recloser will at no time exceed the maximum design voltage of 25.8 kv.



20 KV ROUND-WOUND® TRANSFORMER, specifically designed for this service, with 150 kv BIL, high overload capacity, low exciting current, and low losses.



TYPE HXO POWER FUSE (left) and Type HDO fuse cutout. The 27 kv, 100 ampere HDO has a rated interrupting capacity of 4000 amperes. The 38 kv, 200 ampere HXO has a rated interrupting capacity of 5000 amperes.

How 34.5 kv Distribution Cuts Costs... Here's Data on Methods, Materials

- Idaho Power Company pioneers 20/34.5 kv distribution, with ten years' experience.
- L-M pioneers, with research and development on apparatus, construction materials, and application for this economical distribution voltage.

by J. R. McDONALD, Field Engineer
Line Material Industries

Complete elimination of subtransmission, with fewer substations, higher feeder loading, and reduction of regulating equipment, resulting in lower cost per kva of installed capacity, appear to be among the major advantages afforded by 20/34.5 kv distribution, according to Idaho Power Company.

This progressive company now operates 275 pole line miles at this higher distribution voltage, and is expanding the system to serve additional farm customers. Idaho Power has found economical methods for conversion, and its experience is being generously offered to the industry. At the same time others, such as H. L. Hess of the Public Service Company of Indiana, Inc., have published the results of their studies.

LINE MATERIAL® Industries
McGRAW-EDISON COMPANY
Distribution Equipment
370-R

L-M Provides Information, Apparatus

L-M has collected some of this data, and is offering a compilation, along with information on the apparatus and equipment L-M engineers have developed in working with Idaho Power Company and others.

Mail This Coupon For More Information

Ask your L-M Field Engineer for copies of papers L-M makes available on 20/34.5 kv distribution, or mail the coupon—and we will send them promptly—no obligation.

LINE MATERIAL Industries, Milwaukee 1, Wisconsin EW-1129

Please send, free, copies of the following papers:

- ☐ 20/34.5 kv—An Economic Solution, by Don E. Haasch, Special Studies Engineer, Idaho Power Company
- ☐ 34.5 kv—A Possible Future Necessity, by H. L. Hess, Distribution Engineer, Public Service Company of Indiana, Inc.
- ☐ 20/34.5 kv Multi-grounded Wye Distribution System, by George W. Cooper, Line Material Industries
- ☐ Relative Merits of 20/34.5 kv Distribution by D. L. Andrews, Distribution Studies Engineer, Idaho Power Company
- ☐ The Long-Bus Substation, by D. L. Andrews, Distribution Studies Engineer, Idaho Power Company
- ☐ SEND ALL FIVE PAPERS PLEASE, IN FOLDER IMPRINTED WITH MY NAME

Name_____ Title_____

Company_____

Address_____

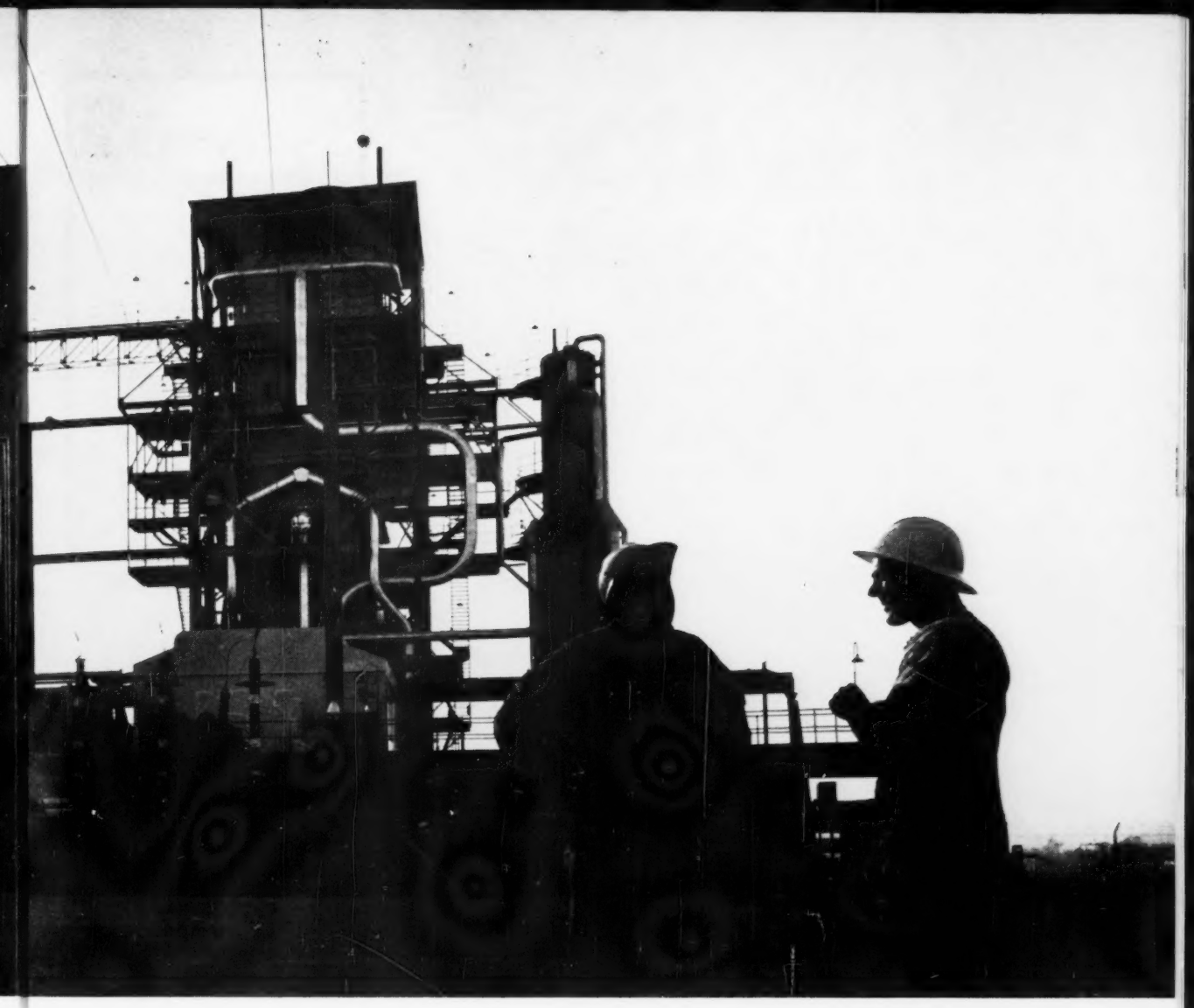
City_____ State_____

New Plant at San Bernardino

The two-unit, 132-m.w. steam plant recently completed [T
San Bernardino for California Electric Power Compa A uniq
has a number of unusual features. lines f

There are only two operating levels—grade and firi Al
aisle. A broad ramp permits access to the firing aisle foot "p
large trucks, and on both levels clearances are ample sweet-
that equipment can be serviced by fork-lifts. All rotati sunk 4
equipment, except turbo-generators, is mounted at grou T
level, minimizing vibration and simplifying maintenan units w

All feedwater heaters, together with many pumps a estima
other auxiliary items, are located in a bay between t within
two turbo-generators, where they are easily accessible S
the gantry crane and to fork-lift maintenance trucks. worked



The plant burns natural gas or heavy residual fuel oil. A unique oil pumping system eliminates the need for heated lines from storage to day tank.

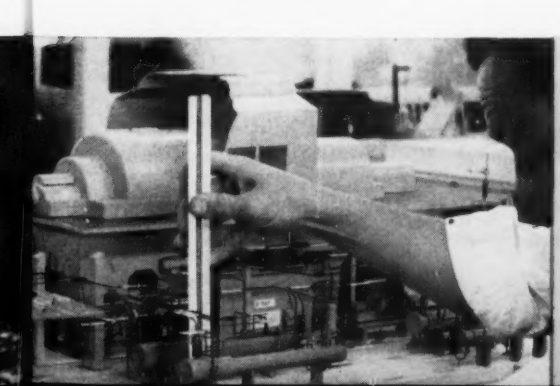
All principal water tanks are combined into two 82-foot "pisa towers" which support the deaerators, and all sweet-water condensates drain into two collecting wells sunk 42 feet below ground level.

The plant is operated by three men per shift. Both units were completed ahead of schedule and below the cost estimate, and both were placed in commercial operation within two weeks after first roll-over.

Structural layout and all important details were worked out on a scale model before any drafting was done. Calectric engineers were able to watch their plant grow in three dimensions, approving each detail as it was added to the model.

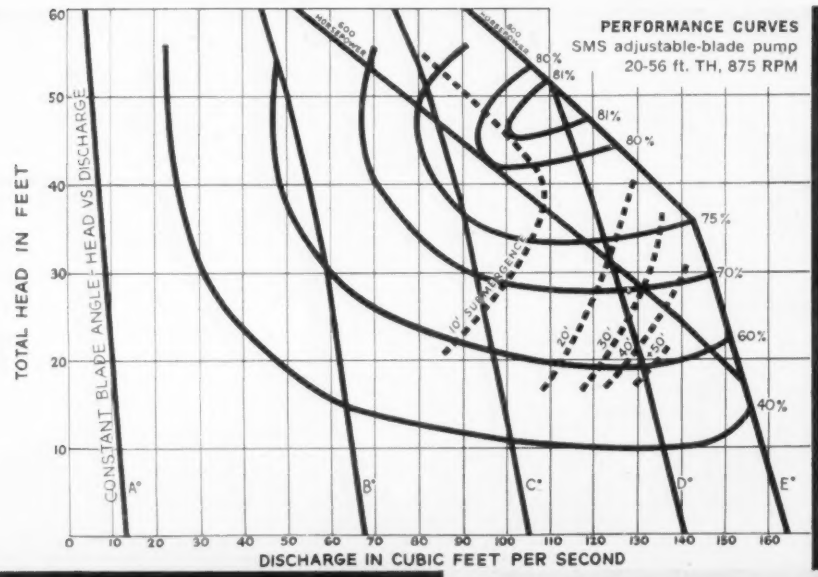
The plant was built by Fluor under a total-responsibility contract covering economic study, design, engineering and construction. This arrangement enabled Calectric to exercise complete day-to-day control over the entire course of the project, in close liaison with Fluor project management.

The Fluor brochure, "Calectric's San Bernardino Steam Plant," describes this unusual station in detail. Write to Department #23, The Fluor Corporation, Ltd., 2500 South Atlantic Boulevard, Los Angeles 22, California.

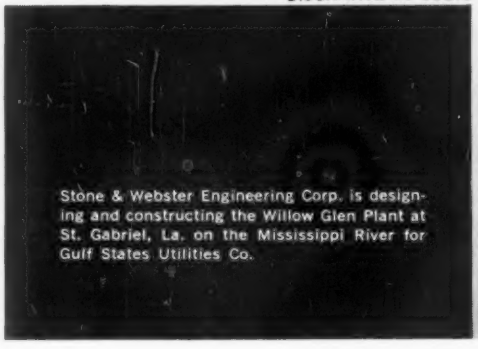


When you consider expansion...
the most important investment you can make
is in the creative ability of men

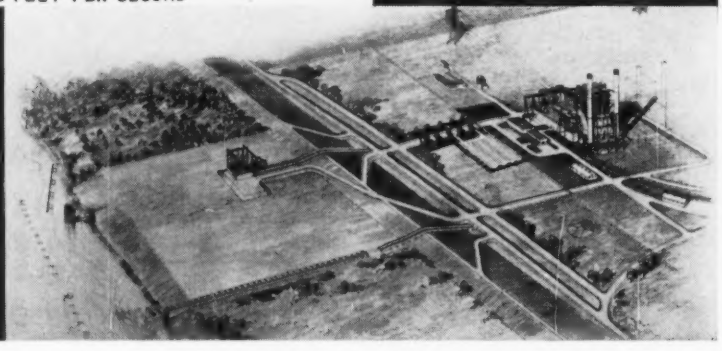
FLUOR
Engineers & Constructors



Performance curves of the SMS adjustable-blade axial flow pumps for Willow Glen illustrate their extreme flexibility. Pump operation is not restricted to a single head-discharge curve as is the case with fixed-blade pumps, but provides any discharge and head combination within the limits of motor horsepower and proper submergence.



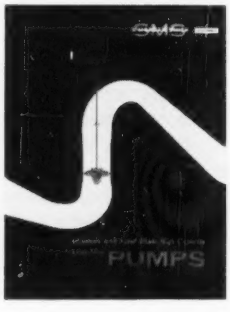
Stone & Webster Engineering Corp. is designing and constructing the Willow Glen Plant at St. Gabriel, La. on the Mississippi River for Gulf States Utilities Co.



Flexibility and efficiency make SMS adjustable-blade pumps choice for Willow Glen

Two 30-inch SMS adjustable-blade axial flow pumps will be installed to provide condenser water for Unit #1 at the new Willow Glen Power Station. To meet the requirements at minimum river level, and with water temperatures that vary between 39°F and 90°F, the pumps are designed to deliver a total of 76,000 gpm against a 54-foot total head.

Extreme variation of suction pool elevation and the flexible condenser operation required for this station made adjustable-blade pumps the logical and economical choice. SMS adjustable-blade pumps attain relatively high efficiencies over a wide discharge and head range. This is accomplished by varying the pitch of the impeller blades while the pump is operating at constant speed. This adjustability keeps pumping costs at a minimum by combining low starting torque with high average efficiency.



Pump Bulletin 165 will give you complete information on SMS high capacity axial flow pumps. To get your copy, write to S. Morgan Smith Co., York, Penna.

S. MORGAN SMITH

AFFILIATE: S. MORGAN SMITH, CANADA, LIMITED

RESEARCH · DESIGN · HYDRODYNAMICS · ENGINEERING · FABRICATION

More Power To . . .

Rotovalves • Ball Valves • R-S Butterfly Valves • Free-Discharge Valves • Liquid Heaters • Pumps • Hydraulic Turbines & Accessories

Sure it will work on EHV!

For anyone planning an extra-high voltage line, it's good to know that workable hardware and insulator designs have already been established and proved through performance.

Take the matter of shielding the lower suspension insulators in a string, the suspension clamp and conductor. Most power companies want to hold RIV for extra-high voltage at the same level as 138-kv or 230-kv lines that are already operating satisfactorily. Made for that kind of control, the inexpensive shields shown here have been performing successfully for seven years. Designs were developed which gave maximum control with little reduction in flashover value.

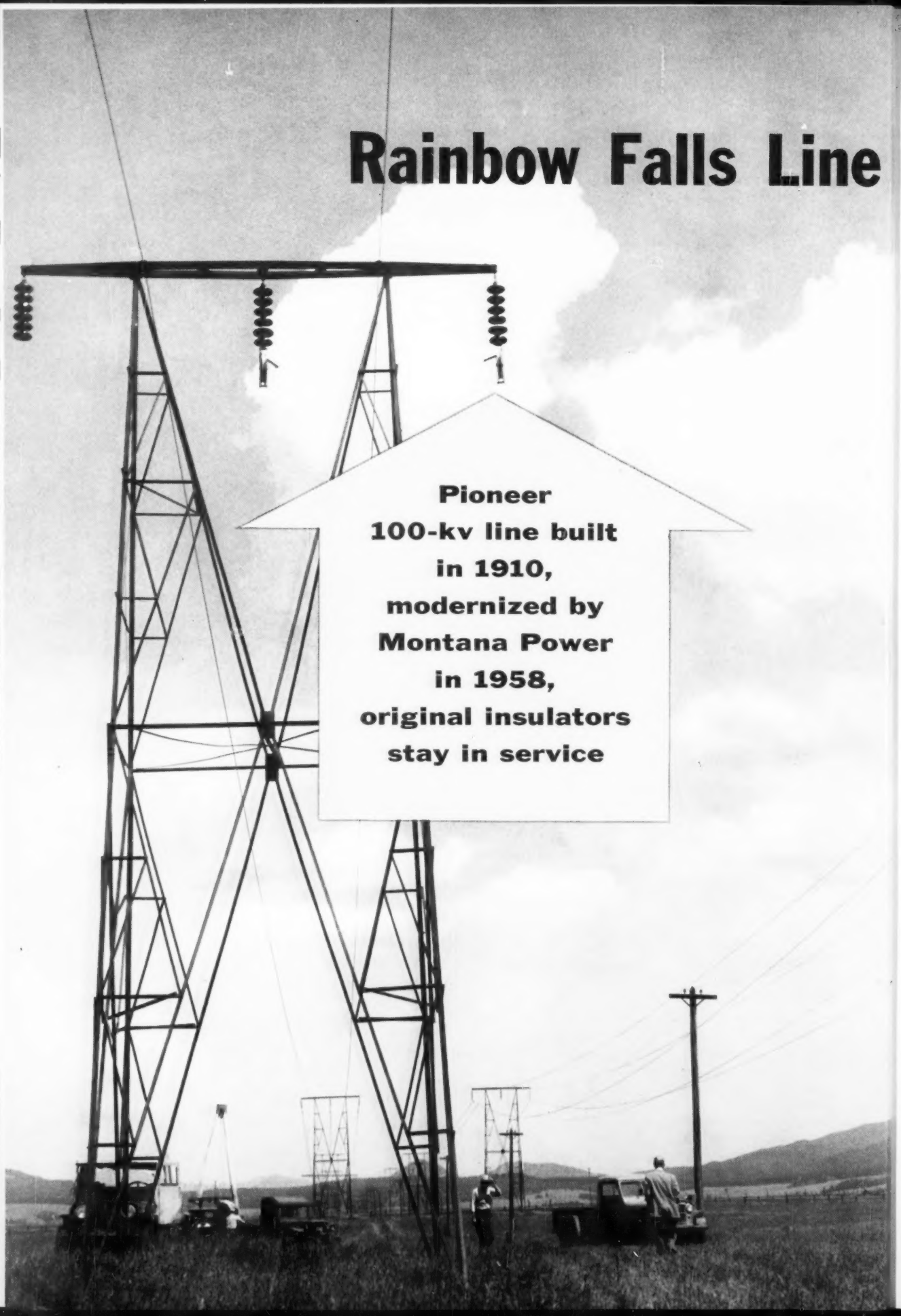
When shielding questions arise, you can see the benefit of having experience with design and manufacture of both insulators and hardware. Since O-B is the only manufacturer that makes both, we naturally have an advantage. It's an advantage we're happy to pass along to you in helping solve your EHV problems.

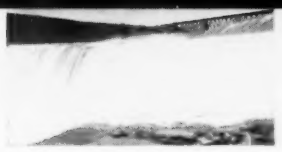
OHIO BRASS COMPANY, MANSFIELD, OHIO
Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

Ohio Brass (B) HOLAN

PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS
BUSHINGS · HOLAN TRUCK-MOUNTED POWER DEVICES AND BODIES · BRONZE VALVES

Rainbow Falls Line M





Makes Transmission History

History - -

In 1805 Captain Meriwether Lewis of the Lewis & Clark expedition christened one of the series of falls in the head waters of the Missouri River "Rainbow Falls." In 1910, two parallel, 100-kv transmission lines were built from Rainbow Falls over 130 miles of mountainous and semi-mountainous terrain to Butte, Montana. A single line continued for 22 miles to Anaconda. Rainbow Falls was the second transmission line in North America to use the O-B one-piece porcelain, cap-and-pin suspension insulator.

Performance - -

EHV OF 1910 PROVES PRACTICAL

The Transmission Department of Montana Power Company (then Great Falls Power Company) soon learned that operating a 100-kv system was no more difficult than 50-kv had been. The line proved basically trouble-free, providing a dependable power supply for Butte and Anaconda.

Modernization - -

LINE CAPACITY INCREASED IN 1958

To increase capacity of the line from 35-mw to 60-mw, it was decided to reconductor the Rainbow Falls lines in 1958. The original 1/0 hemp-core copper conductor was replaced with 336.4 MCM ACSR. Realizing that increased conductor loading would encroach on the safety factor in some areas, Montana Power relocated some towers and built intermediate towers where loading after reconductoring indicated more tower strength was needed. During reconductoring, old insulator strings on hold-down structures and in strain positions were changed over to modern units. But the rest of the insulators from the 1910-13 period - - almost 88 per cent of the total - - remained in service.

The Line Today - -

STILL A VITAL PART OF MONTANA POWER SYSTEM

Rainbow Falls remains an important power supply to Butte and Anaconda. But in 1910 the Montana Power system peaked at 50,000 kw. Today the peak is 540,000 with a system capability of 671,000. Top transmission voltage has risen to 161-kv, with 551 miles of 161-kv line criss-crossing the Company's 90-thousand-square-mile service area. After Rainbow Falls, another 1016 miles of 100-kv line were added to the system. Through the years, O-B suspension insulators have been highly regarded by the Montana Power Company . . . the result of a precedent established by their reliable performance on the pioneer line of 1910.

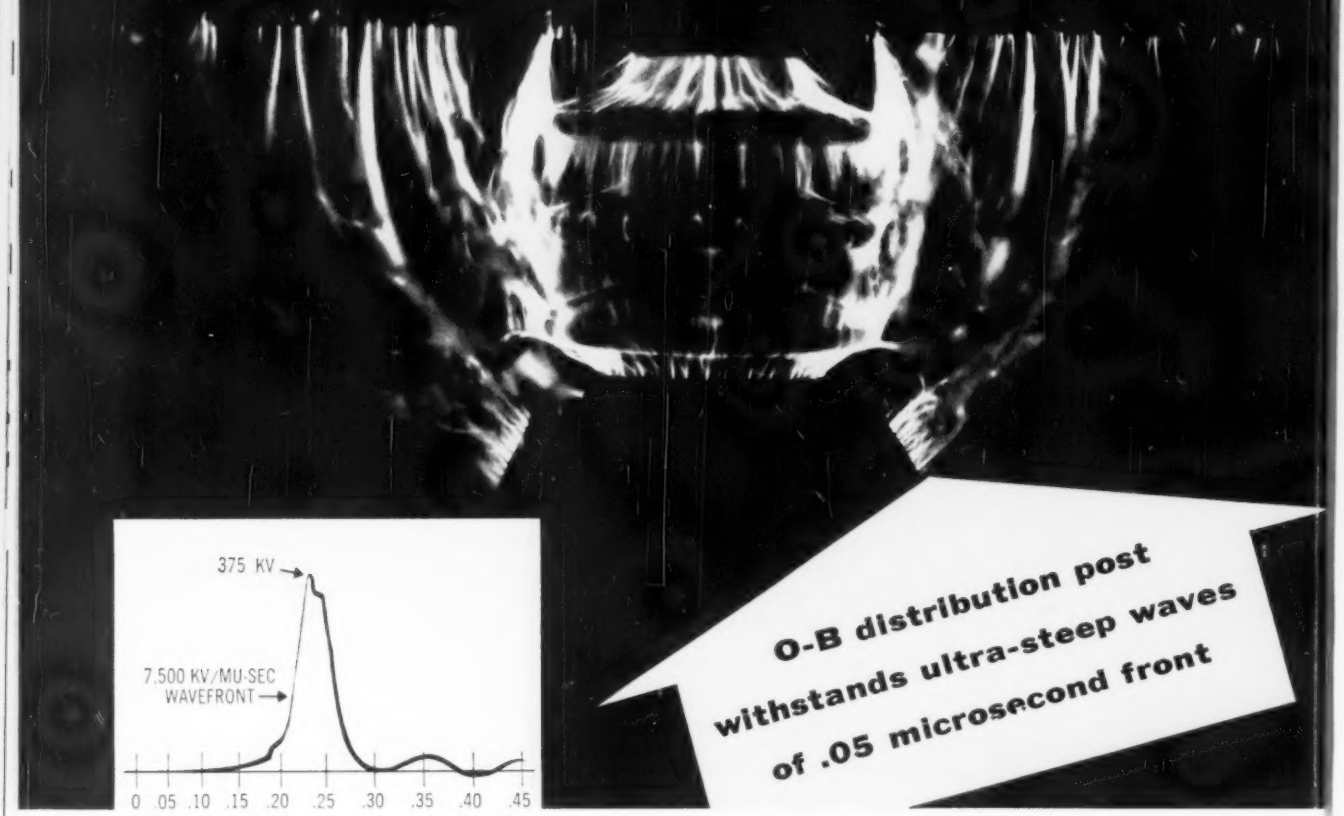
OHIO BRASS COMPANY, MANSFIELD, OHIO

Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

Ohio Brass (B) HOLAN

PORCELAIN INSULATORS • LINE HARDWARE • CAPACITORS • LIGHTNING ARRESTERS
BUSHINGS • HOLAN TRUCK MOUNTED POWER DEVICES AND BODIES • BRONZE VALVES

After this, lightning looks easy



Oscillogram of steep-wave flashover of O-B distribution post. In addition to seven-inch model (below), O-B has a nine-inch post which has withstood similar flashovers.

O-B distribution post withstands ultra-steep waves of .05 microsecond front

If you want protection against lightning damage built right into the insulators for your next distribution line (up to 25 kv), take a good look at the O-B distribution post.

We've just seen new evidence of its ruggedness. With the help of new testing techniques and of new instrumentation, the O-B high-voltage laboratory has produced ultra-steep wave fronts of .05 microseconds and under (remember when a 1½ microsecond front was considered a severe discharge?). Rate of rise of the wave is 7500 kv per microsecond.

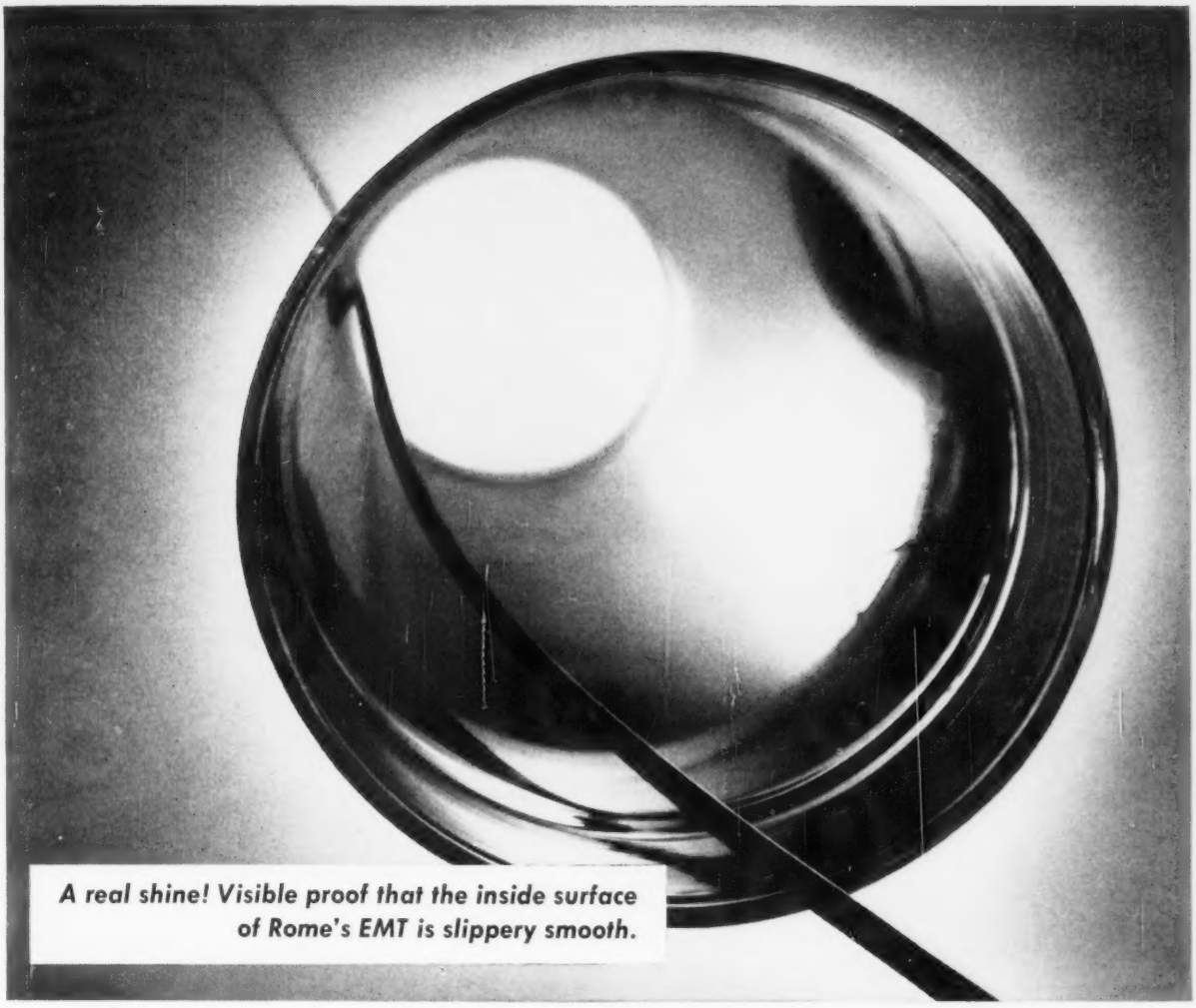
The photograph was taken approximately .01 microseconds *before* flashover and shows the extreme stress exerted on the insulator just before it flashes over — visual proof of ability to stand up under these ultra-steep waves.

O-B has two models of this distribution post. One has a seven-inch porcelain height with 11 inches of leakage distance; the other is nine inches high with 15 inches of leakage distance. You have a choice of studs and brackets to provide a variety of mounting arrangements.

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass HOLAN

PORCELAIN INSULATORS • LINE HARDWARE • CAPACITORS • LIGHTNING ARRESTERS
BUSHINGS • HOLAN TRUCK MOUNTED POWER DEVICES AND BODIES • BRONZE VALVES



A real shine! Visible proof that the inside surface of Rome's EMT is slippery smooth.

"Tape's eye view" shows why Rome's EMT is easiest to fish

That shine you see is the reason fish tape won't "hang up" when you use Rome's EMT.

The slick interior finish of Rome's EMT lets your fish tape slide through with an absolute minimum of resistance. Careful baking—under rigid control—produces a uniformly smooth enamel-like finish inside Rome's EMT.

In a test conducted by the Anstice Company, a completely unbiased party, Rome's EMT came out first in fishability. Three ten-foot lengths of ½" EMT, Rome's and two competitive samples, were formed into identical figures containing eight bends. The ⅜" fish tape used in the test easily passed through the eight bends in Rome's EMT, but "hung up" on one of the bends in both competitive samples.

Strong weld In another test to determine the strength of the weld on Rome's EMT, a sample was squeezed, flared, flattened, and expanded. In each case, the weld proved to be as strong as the metal itself.

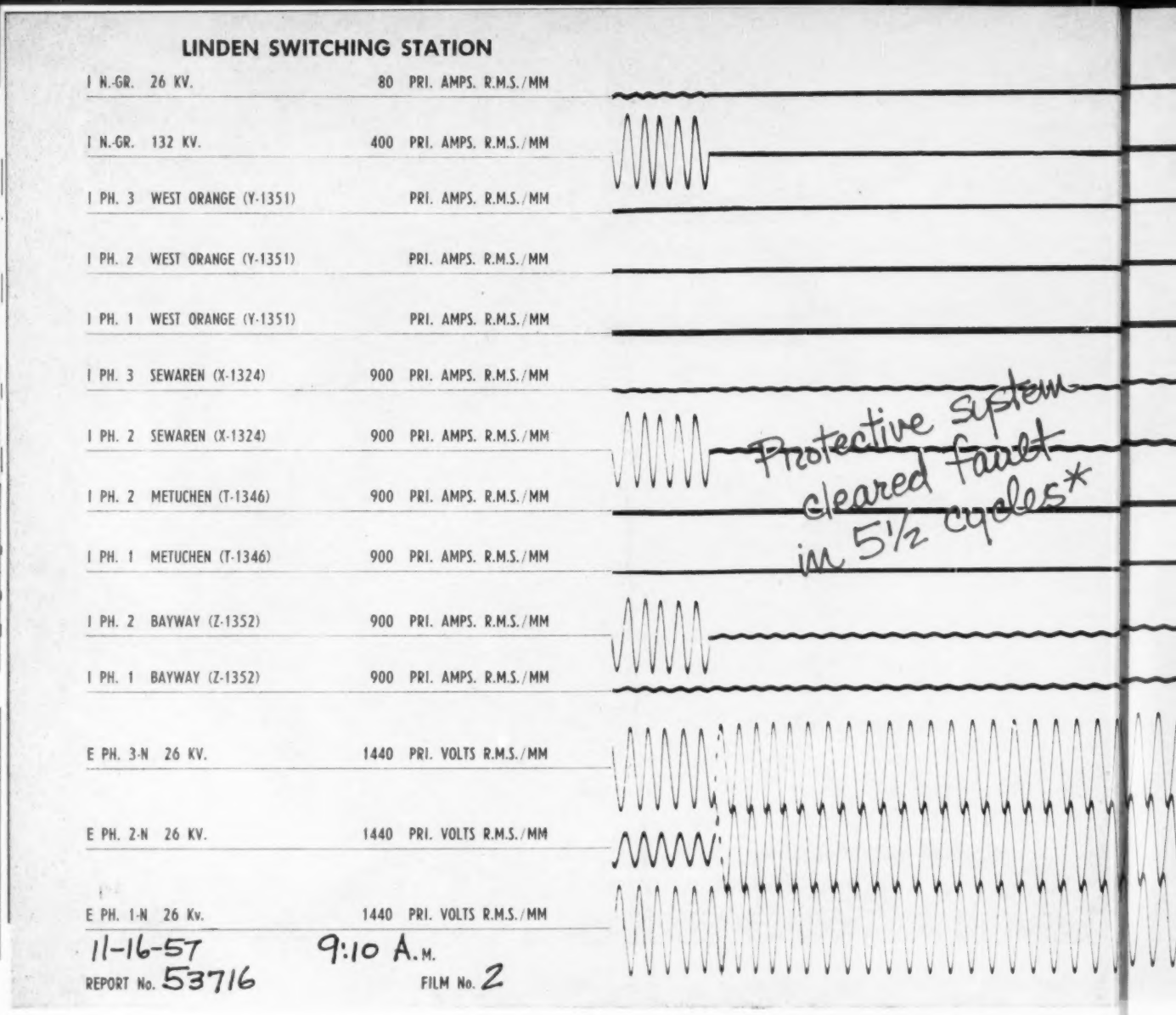
Easy bending The strength of Rome's EMT interferes in no way with its ductility. You can make bends—even intricate ones—quickly and easily.

Corrosion resistance A uniformly electrogalvanized exterior finish protects your installation against corrosion. Long dependable service life is assured.

Use easy-fishing, easy-bending Rome EMT on your next job. Contact your nearest Rome Cable representative for more information—or write to Department 905, Rome Cable Corporation, Torrance, California.

ROME CABLE

CORPORATION


LINDEN SWITCHING STATION
I N.-GR. 26 KV. 80 PRI. AMPS. R.M.S./MM
I N.-GR. 132 KV. 400 PRI. AMPS. R.M.S./MM
I PH. 3 WEST ORANGE (Y-1351) PRI. AMPS. R.M.S./MM
I PH. 2 WEST ORANGE (Y-1351) PRI. AMPS. R.M.S./MM
I PH. 1 WEST ORANGE (Y-1351) PRI. AMPS. R.M.S./MM
I PH. 3 SEWAREN (X-1324) 900 PRI. AMPS. R.M.S./MM
I PH. 2 SEWAREN (X-1324) 900 PRI. AMPS. R.M.S./MM
I PH. 2 METUCHEN (T-1346) 900 PRI. AMPS. R.M.S./MM
I PH. 1 METUCHEN (T-1346) 900 PRI. AMPS. R.M.S./MM
I PH. 2 BAYWAY (Z-1352) 900 PRI. AMPS. R.M.S./MM
I PH. 1 BAYWAY (Z-1352) 900 PRI. AMPS. R.M.S./MM
E PH. 3-N 26 KV. 1440 PRI. VOLTS R.M.S./MM
E PH. 2-N 26 KV. 1440 PRI. VOLTS R.M.S./MM
E PH. 1-N 26 Kv. 1440 PRI. VOLTS R.M.S./MM
Protective system cleared fault in 5½ cycles*
11-16-57 9:10 A.M.
REPORT No. 53716 FILM No. 2

A pothead failed . . .

RECORD ENDS GUESSWORK AS TO OPERATION OF PROTECTIVE SYSTEM

This is the record made by a Hamilton RS-9 Automatic Oscillograph when a pothead failed at the Linden Generating Station of the Public Service Electric and Gas Co., Newark, New Jersey.

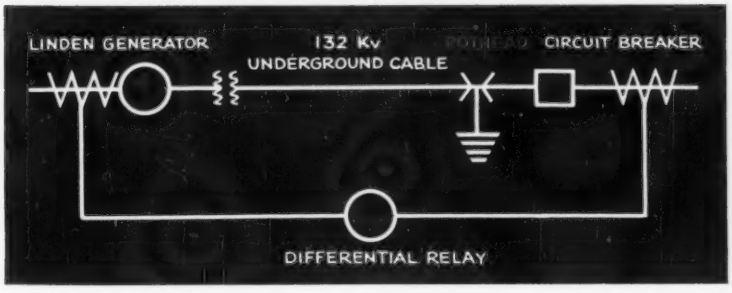
Analysis of the record shows that failure was from phase 2 to ground; and that the fault was located at a pothead on the underground cable carrying 132 KV, connecting the 450,000 KW capacity power plant to the switching station.

Most important, the record shows that the breakers of the high speed differential protective system cleared the fault within 5½ cycles—providing complete assurance that the protective system operated as designed, saving possible outage, damage and loss of revenue.

The Public Service Electric and Gas Co. has several Hamilton RS-9 Automatic Oscillographs standing by, monitoring their system. Within 2 milliseconds after a fault occurs, an instrument is automatically at work, making a permanent record of the transient wave forms. The time and date of the fault are recorded. Then, after the fault has cleared, the oscillograph stops and automatically resets itself to record the next fault.

The RS-9 provides an accurate record of the sequence of operation of a protective system of relays and breakers, ending time-consuming, inconclusive guesswork. It can provide assurance that the protective system is operating properly...that generators, large power transformers and transmission line facil-

Nov 16 9 10 AM 55 50



ities are fully protected. And it can warn of the malfunctioning of protective equipment before damage is caused.

There are two models of the Hamilton RS-9 Automatic Oscillograph. The RS-9 Fourteen has 14 channels for recording information. The RS-9 Thirty has 32 channels, providing a system with the extra capacity required in future years as the system becomes more complex.

For complete information about the RS-9 Automatic Oscillograph, write: Hamilton Watch Company, Hathaway Instrument Division, Denver, Colorado.

HAMILTON WATCH COMPANY
HATHAWAY INSTRUMENT DIVISION
5800 East Jewell Avenue · Denver 22, Colorado

at last! Here's the KEY to a safe, economical, attractive underground distribution system

RT&E Terra-Tran

The new, completely self-contained TERRA-TRAN for underground distribution reduces transformer installation costs. No separate enclosures or protective equipment required. Full KVA from transformer — no derating. This means lower cost for the complete underground system.

The new, attractive TERRA-TRAN is designed for pleasing appearance, painted to harmonize with the suburban landscape. Unobtrusive, easily camouflaged by shrubbery. Poles and wires are eliminated, enhancing the general appearance of the entire area.

The new, extra-safe TERRA-TRAN has all live parts enclosed in a locked, tamper-proof compartment. In addition, special interlock on door prevents entry of foreign objects.

The new, versatile TERRA-TRAN transformer is admirably adapted to new suburban residential areas, to shopping centers, to schools and institutions, and to industrial parks. Available in single and three-phase applications.

A Swinging door provides authorized service access to operating compartment for service personnel only. Door has baffle edge to prevent accidental contact with live parts.

B Externally operated bayonet type disconnect switch designed for hook stick operation.

C Externally replaceable bayonet type primary fuse designed for hook stick operation.

D Features the industry-famous RT&E wound core with high mechanical strength, repairability, light weight, low losses, and low exciting currents.

E Low voltage bushings externally clamped for easy inspection and maintenance.

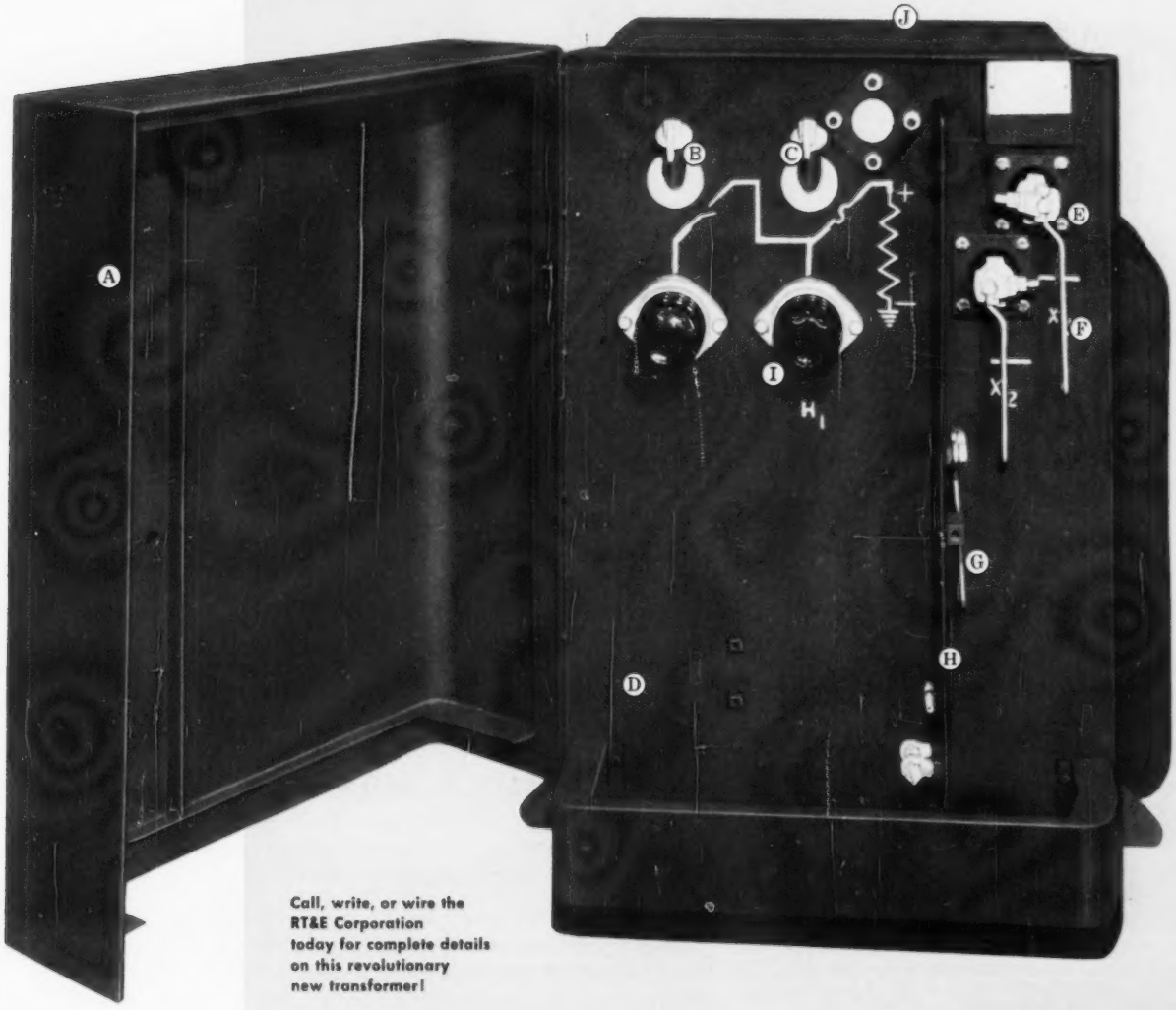
F Extended copper bus provides ample space for terminating multiple secondary leads.

G Extended copper bus for secondary ground connectons.

H Steel safety divider between high and low voltage sections.

I Externally-clamped, insulated knob-type high voltage bushings are specially designed for terminating shielded high voltage cable.

J Tamper-proof cover, arc-welded to heavy gauge steel tank.

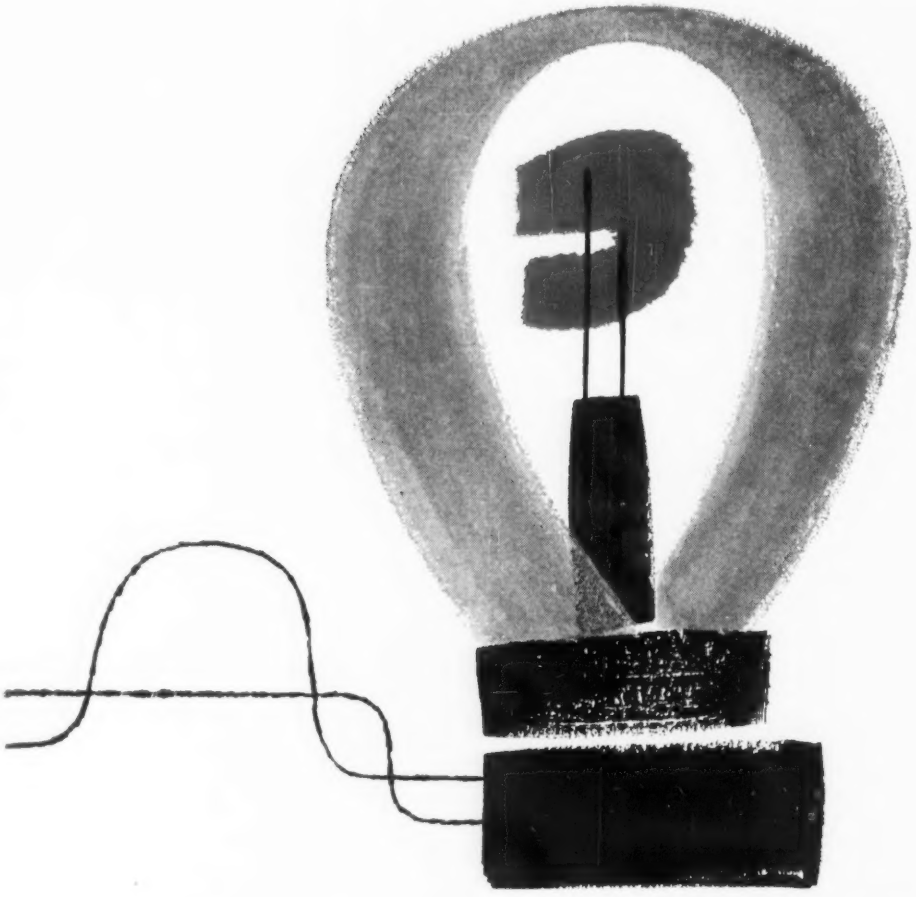


Call, write, or wire the RT&E Corporation today for complete details on this revolutionary new transformer!

RT&E CORPORATION

WAUKESHA, WISCONSIN • PORTLAND, OREGON

call KE for plant expansion or new facilities



INGENUITY

has made KE a major builder of dependable power facilities

100,000 kw steam power plant now under construction at Josephtown, Penn., for St. Joseph Lead Company, a large American lead and zinc producer. The new turbo-generator plant is being designed and built by KE's thermal power plant specialists.

Since installation, no unscheduled outages have occurred in power plants built by Kaiser Engineers. On the contrary, in numerous cases KE-built plants have fed power into neighboring systems temporarily "down."

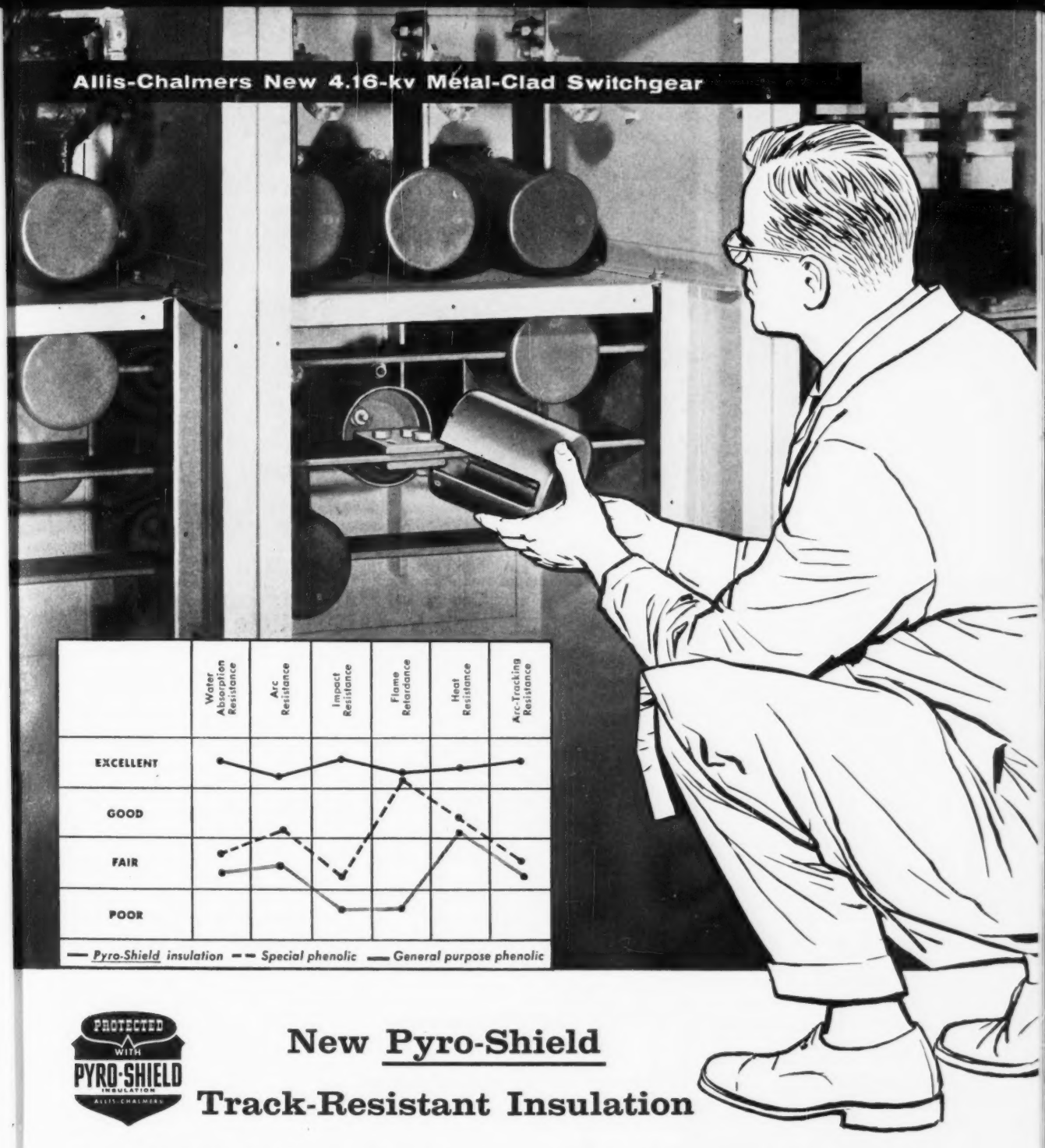
Preventing outages, building in reliability that insures against service interruption—these are benefits of engineering and construction ingenuity as surely as are low initial cost, fast completion, and low operating cost.

Experienced KE engineers can take your power plant idea from conversation through completion; conduct every phase from economic analysis through operator training. Whether your future power needs are thermal or nuclear, call KE.

KAISER ENGINEERS engineers—contractors
Contracting since 1914

Division of Henry J. Kaiser Company • Oakland 12, California • New York, Pittsburgh, Washington, D.C., Buenos Aires, Calcutta, Dusseldorf, Montreal, Rio de Janeiro, Sydney, Tokyo

4388



PROTECTED WITH PYRO-SHIELD INSULATION ALLIS-CHALMERS

New Pyro-Shield Track-Resistant Insulation

Track-resistant *Pyro-Shield* insulation is a polyester glass base material now used in Allis-Chalmers coordinated system of switchgear insulation.

One molding connects primary disconnects to bus bars to provide uniform insulation and reduce the number of insulation components.

In addition to being track resistant, *Pyro-Shield* insulation has high impact strength, which eliminates risk of damage from short-circuit stress and assures low moisture absorption.

Other advantages are: high flame retardance; long life — even at high temperatures; resistance to chemical fumes; and bus joint construction that eliminates need for skilled taping techniques.

Get details on this new insulation and other Allis-Chalmers switchgear features, including the low 72-inch silhouette and new *Shelter-Clad* design. Contact your nearby Allis-Chalmers office, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

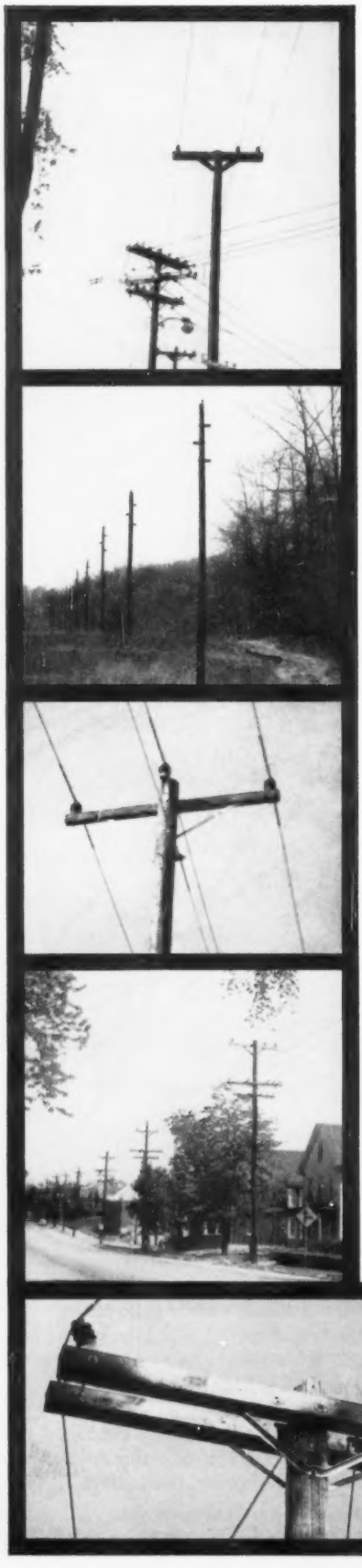
For Progress in Switchgear

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

Pyro-Shield and Shelter-Clad are Allis-Chalmers trademarks.

A-5862



LAPP DISTRIBUTION POSTS

Line Post reliability for distribution lines up to 27 kv

No distribution line you can build will serve as dependably, save as much sleep for your maintenance crews, or build as much customer good-will, as the one you put on Lapp Distribution Posts. These trim-appearing "junior Line Posts" just won't puncture . . . their solid one-piece porcelain body separates conductor from ground for its full length. Won't crack either . . . the only metal-to-porcelain joint is at the base; loading of porcelain is only in large-area, low-intensity compression. Greatly more resistance to flashover and impact, too . . . has short super-sturdy petticoats, with extra protection against failure in the fact that when petticoats are broken away, the post body remains intact with almost its full insulating values. Completely free of radio- or TV-interference at any operating voltage. Fog-type for superior performance in dust or atmospheric contamination.

Where else can you get so much for so little cost? Better look into it.

Lapp Insulator Co., Inc., Le Roy, New York.

Lapp

Use of aluminum in a new generating station, switchyard and transmission line brings the experience and judgment of Alcoa field advisor Shorty Lowe (center) to the scene.

ALCOA RESEARCH

. . . development today for tomorrow's loads

HOW ALCOA FIELD ADVISORS HELP SPEED CONSTRUCTION, REDUCE COSTS

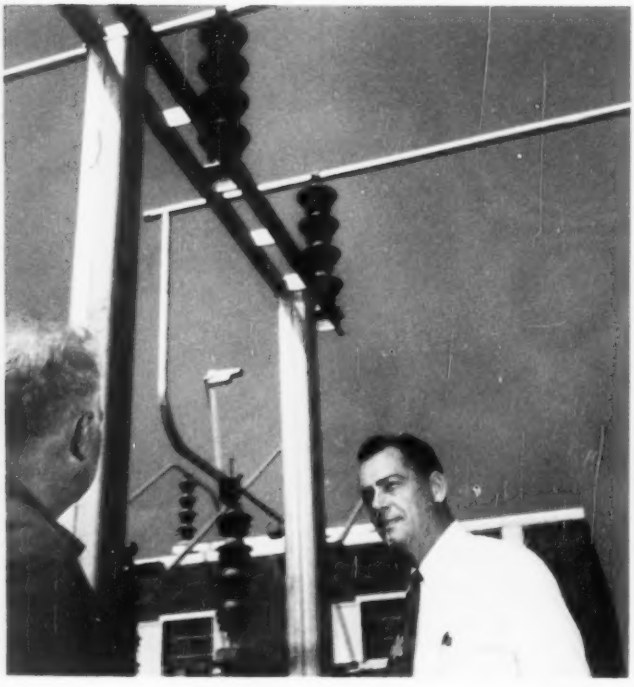
ALCOA

FIELD ADVISORS: HELPFUL ADVICE ON THE SPOT

To help solve transmission and distribution problems—before they develop—Alcoa has field advisors located at strategic points throughout the United States. These specialists are available to help utilities in three important respects: design consultation, installation and product improvement.

Each Alcoa field advisor has a common determination: to be competent, diplomatic and helpful. There are few problems in stringing, sagging or any other aspect of modern aluminum conductor installation that he has not encountered. He is a qualified expert in aluminum welding and other joining techniques. Substation erection problems are completely familiar to him. ACSR—Bus—Conduit uses are his everyday ABC's. Frequent refresher courses keep him up to date. His counsel saves thousands of dollars for utilities every year.

This extra service . . . at no extra cost . . . is another way Alcoa is helping utilities to transmit and distribute more kilowatts per invested dollar.



Inspection by Hank Meece (right) is part of the determined follow-up that can be expected from Alcoa field advisors.

Bob Hyde checks bolt assembly in an aluminum substation structure to ensure long, maintenance-free performance.

Design Consultation—Because of their broad experience, Alcoa field advisors can make many money-saving suggestions on construction methods and equipment before installing Alcoa® Conductors and Accessories.

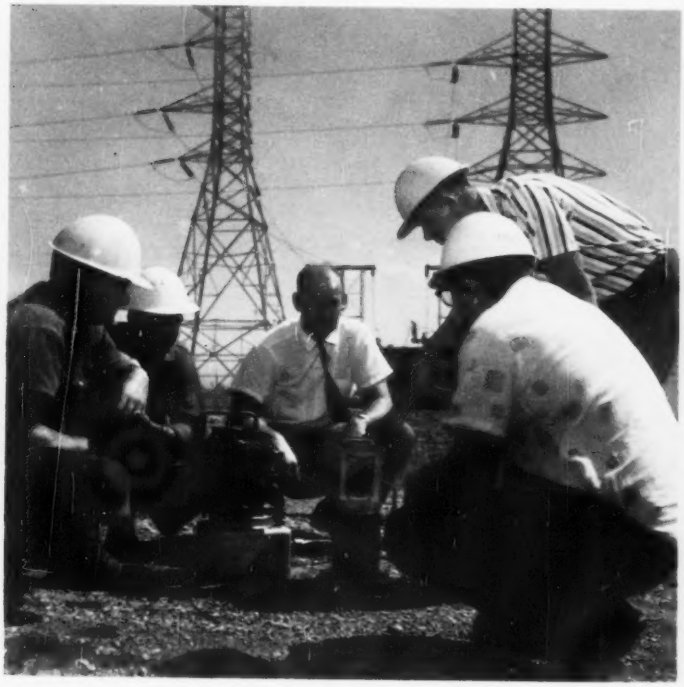
Installation Help—At the job site, Alcoa field advisors work with construction crews on the correct application of conductors, accessories and tools. They also help solve special problems arising from terrain or type of erection equipment. They prepare inspection reports on each job they visit which are of great value to both the utilities and Alcoa design engineers.

Product Improvements—Alcoa field advisors observe special problems and unusual installation features which they encounter, providing background for improvement of Alcoa products and development of new designs.

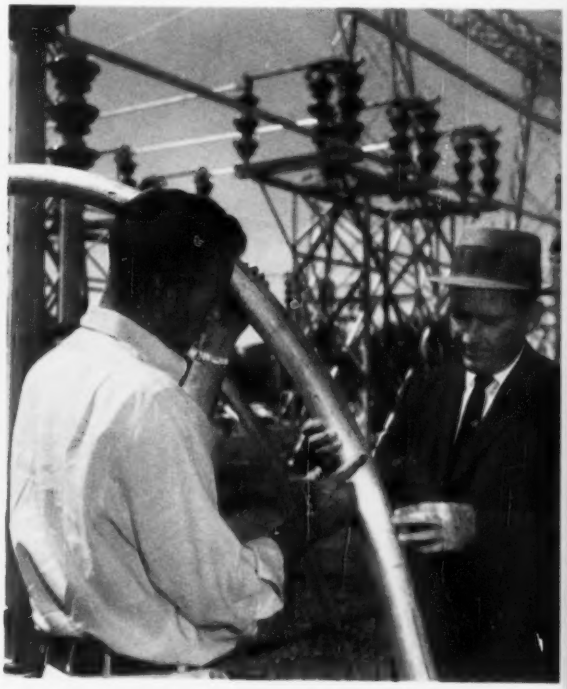
ALCOA ALUMINUM

ALCOA RESEARCH

. . . development today for tomorrow's loads



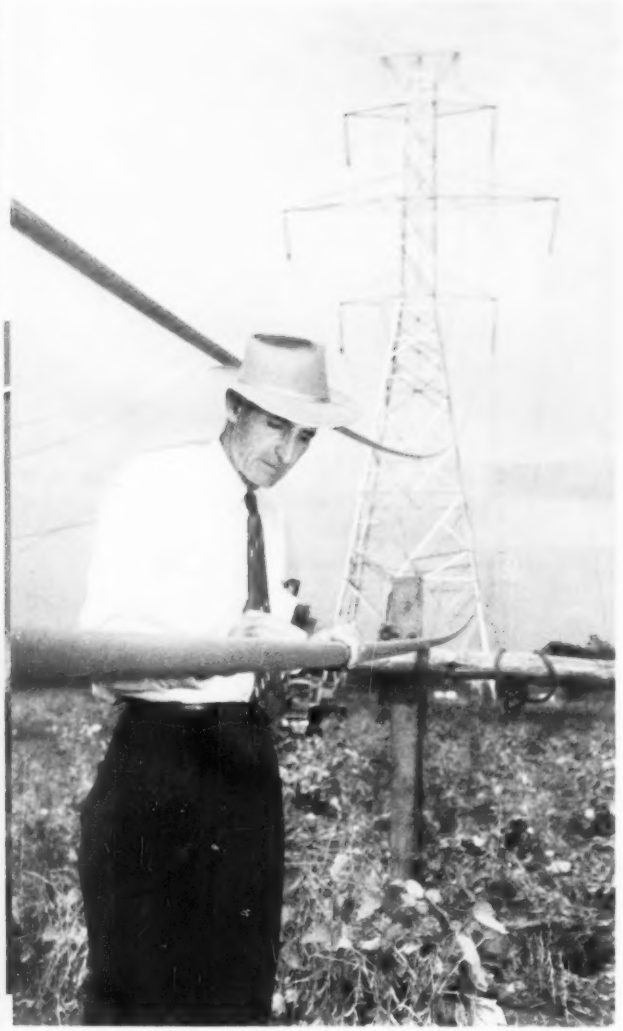
Field advisor (center) Ralph Huston's years of experience with conductor accessories can be brought to bear on any problem that might develop here.



Bill Rice (right) can tell you all about efficient installation and joining techniques with aluminum bus conductors.

ALCOA

FIELD ADVISORS HELP SERVE YOU



In picture above, Jim Sunderland's know-how helps another customer benefit from the unique performance and installation advantages of Alcoa Aluminum Rigid Conduit.

On-the-job help is the specialty of Alcoa's field experts. In picture at left, Bill Stokes checks some Alcoa ACSR on the site.

For more information on any application of aluminum in the electrical industry, call Alcoa.

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

Your Guide to the Best in Aluminum Value

For Exciting Drama Watch "Alcoa Theatre," Alternate Mondays, NBC-TV, and "Alcoa Presents," Every Tuesday, ABC-TV

How General Electric Power Groove Lamps helped
Chicago's State Street win back the title of...

THE BRIGHTEST STREET IN THE WORLD!

These unique "tree-like" poles have individual radio receivers that pick up the control signal for turning lighting on and off; each has 4 luminaires with forced-air cooling for best performance, one horizontal for making sidewalks brighter, safer, pleasanter.

"WHITEWAY" LIGHTING took on a new look when, for the first time, a radio-controlled switch turned on the new G-E Power Groove fluorescent system on Chicago's State Street last November. With a maintained light level of 14 footcandles, this 7 block stretch is now the world's brightest. This is about 10 times the illumination level recommended as adequate for lighting main business streets, 75% more than the next highest street lighting level now in use.

The approved design of poles and fixtures provides a system that is functional as well as unusual and artistic. And they represent more than 2 years of planning on the part of the State Street Lighting Assn., in cooperation with Commonwealth Edison Company.

WHY G-E POWER GROOVE LAMPS WERE CHOSEN. General Electric Power Groove Lamps deliver nearly twice the light of any previous fluorescent the same length. This means you get more light from fewer lamps, fewer fixtures. And you save from 5-20% in original cost compared to other types of fluorescents.

Maintenance costs are lower, too, because there are fewer parts to take care of. Power Grooves deliver good roadway visibility—especially on wet pavement . . . and their special moisture-proof coating makes them ideal for street lighting applications. For more information on street lighting with G-E Power Grooves, write: General Electric Co., Large Lamp Dept. C-902, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Has tools...will travel! Utility and other emergency servicemen swear by this Dodge V-8 Tradesman, and for good reasons. Besides pick-up load space, it has lock-up room for all tools. And with famous Dodge dependability, it has these advantages that come in handy on all service calls: 45 hp. more than Truck "C", 19 more than Truck "F" . . . shortest turning radius . . . the largest payload, load space, and brakes in the low-priced 3.

You can choose a powerful V-8 or thrifty Six, 3- or 4-speed transmission—even push-button automatic LoadFlite. See your Dodge dealer about this Tradesman, or any Dodge truck up to 49,000-lb. G.V.W. Power Giants. Find out why . . .

today,
it's real smart
to choose Dodge
Trucks

A king-sized tool chest on wheels . . . that's the Dodge Tradesman's body. Tools and supplies stow neatly, where you can reach them quickly. A place for everything. All compartments lock. Available sliding roof protects pick-up load space, between body sides. Choice of two body styles.

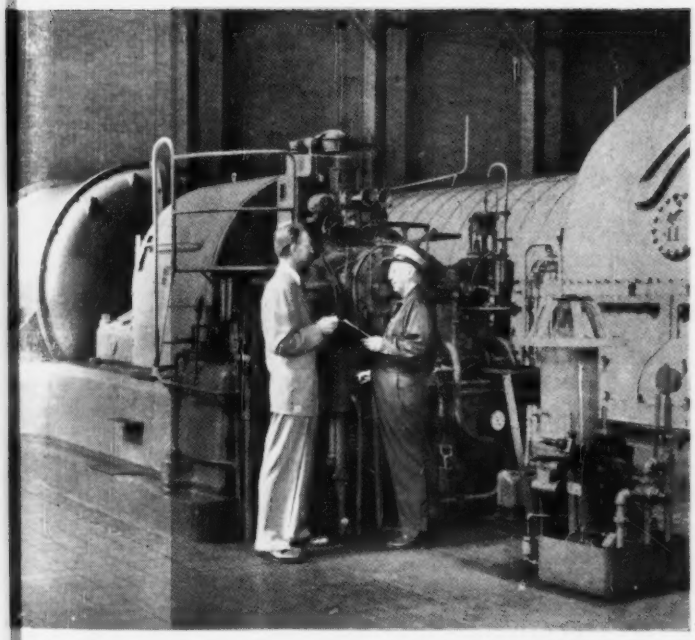
Report from Wisconsin Electric Power Company

HOW THE ONLY OIL WITH LIFE-OF-TURBINE GUARANTEE IS DOING AFTER 27 YEARS

Situation: On February 23, 1931, Wisconsin Electric Power started Turbine 12 at its Lakeside Station – a 7,700 kw. General Electric. The 550-gallon turbine oil reservoir was filled with NONPAREIL. A Standard Oil lubrication engineer was there to supervise the fill. After 30 days a framed certificate was furnished the utility. This certificate guaranteed that the NONPAREIL Turbine Oil would never exceed a level of acidity of 0.15 mg. KOH/g. for the life of the turbine.

What has happened: Analyses of oil samples have been made at regular intervals since the start-up date. The acidity level of the oil now is the same as the day it went into service –0.06 mg. of KOH per gram of oil. In the 27 years since NONPAREIL Turbine Oil was installed, Wisconsin Electric Power has added steadily to its generating capacity. NONPAREIL Turbine Oil has been installed in all turbines.

What to do: Get more information about NONPAREIL from your nearby Standard Oil industrial lubrication specialist in any of the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**



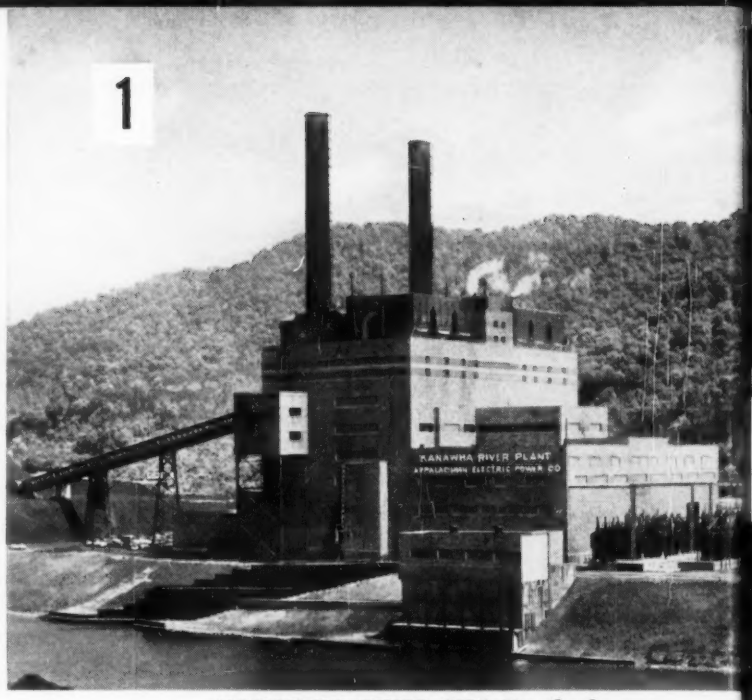
Standard Oil's Robert A. Guis and Lakeside Station superintendent, C. E. Thielman, inspect records of Turbine 12, which has been operating with NONPAREIL Turbine Oil for 27 years. Years of experience providing technical service and an engineering degree qualify Bob Guis for work with utilities on turbine lubrication. Bob has an engineering degree from the University of Wisconsin plus 18 years of this kind of work behind him. In addition, he has completed the Standard Oil Sales Engineering School.

Quick facts about
NONPAREIL Turbine Oil

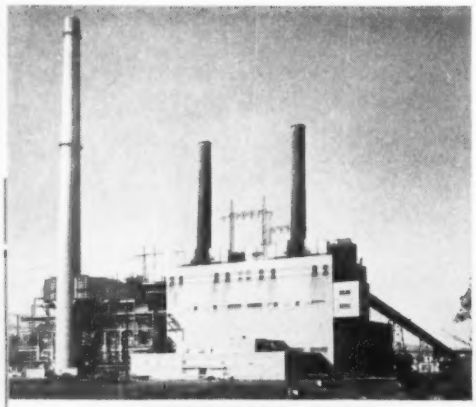
- Will not permit formation of harmful acids
- Will not permit formation of sludge or oil varnish
- Will maintain good demulsibility or water separating characteristics
- Has high resistance to foaming
- Contains adequate rust inhibitor

You expect more from STANDARD and get it!

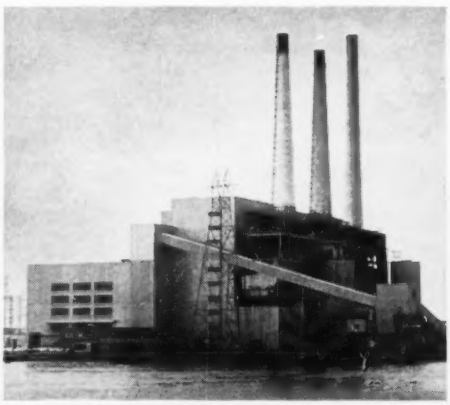
MOST EFFICIENT HEAT RATES IN THE POWER INDUSTRY



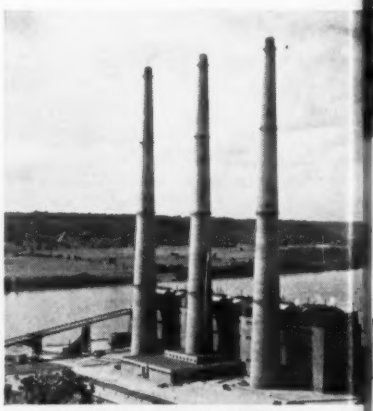
KANAWHA RIVER 9118 Btu/kwhr
Appalachian Power Co. on the American Electric Power System
Two B&W Pressure-Fired Radiant Boilers



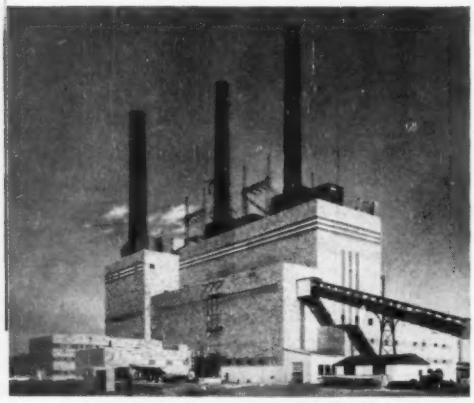
MUSKINGUM RIVER
9139 Btu/kwhr Ohio Power Co.
on the American Electric Power System
Two B&W Pressure-Fired Open-Pass Boilers and one Pressure-Fired Radiant Boiler



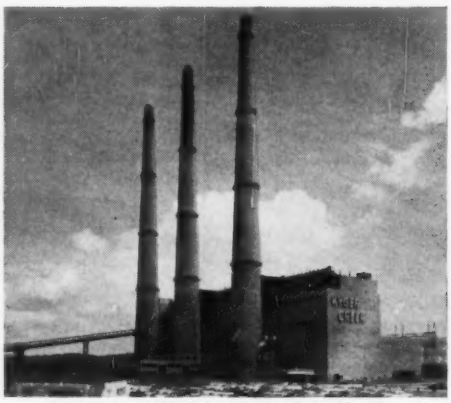
RIVER ROUGE 9140 Btu/kwhr
Detroit Edison Co.
One B&W Radiant Boiler
Firing 10% Blast Furnace Gas and 90% Coal



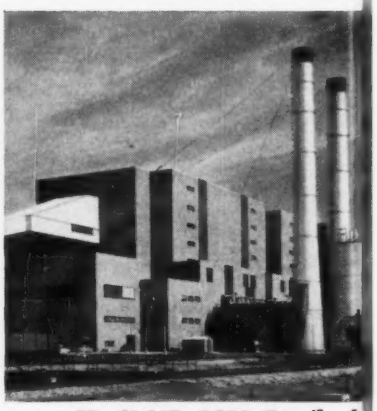
CLIFTY CREEK 9147 Btu/kw
Indiana-Kentucky Electric Corporation
Six B&W Pressure-Fired Open-Pass Boil



TANNERS CREEK 9180 Btu/kwhr
Indiana & Michigan Electric Co.
Power System on the American Electric
Three B&W Pressure-Fired Radiant Boilers



KYGER CREEK 9201 Btu/kwhr
Ohio Valley Electric Corporation*
Five B&W Pressure-Fired Open-Pass Boilers



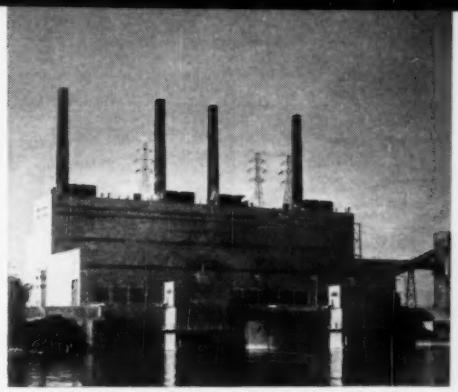
ST. CLAIR 9210 Btu/kwh
Detroit Edison Co.
Four B&W Radiant Boilers

ALLEN 9349 Btu/kwhr
Duke Power Co.

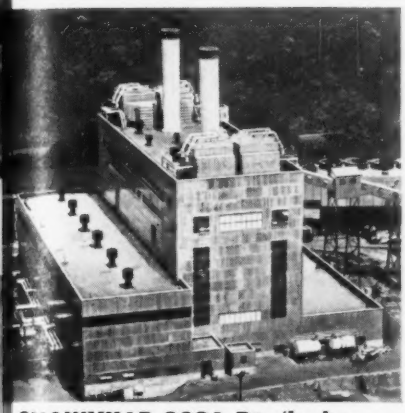
JOHN SEVIER 9350 Btu/kwhr
Tennessee Valley Authority

MILLIKEN 9371 Btu/kwhr
New York State Electric & Gas Corporation

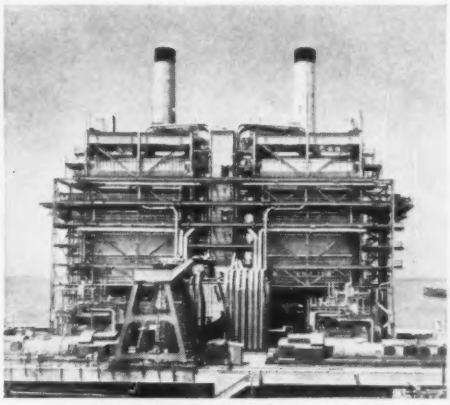
BAY SHORE 9210 Btu/kwhr
Toledo Edison Co.
One B&W Radiant Boiler



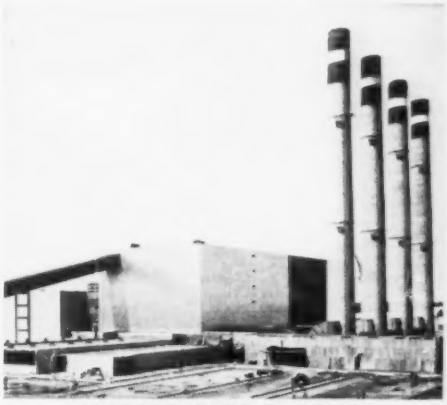
PHILIP SPORN 9370 Btu/kwhr
Appalachian Power Co. and Ohio Power Co.
on the American Electric Power System
Four B&W Pressure-Fired Radiant Boilers



SHAWVILLE 9396 Btu/kwhr
Pennsylvania Electric Co.
Two B&W Radiant Boilers



EL SEGUNDO 9467 Btu/kwhr
Southern California Edison Co.
One B&W Radiant Boiler



COLBERT 9470 Btu/kwhr
Tennessee Valley Authority
Four B&W Radiant Boilers

B&W Boilers Help Put 12 Power Plants Among Top 15 Most Efficient in Nation . . .

Outstanding proof that B&W engineering developments lead the way to reliable, economical power production

Of the 15 most efficient power plants in the United States as reported by the Federal Power Commission, 12 have B&W Boilers. Why? Because B&W's major investment in engineering research and development has led to great strides in power plant efficiency.

B&W is working with the Power Industry to keep electricity America's best bargain despite rising fuel and operating costs. Right now, B&W is investing millions of dollars in improved products—such as the Universal Pressure Boiler—in the better utilization of low grade fuels, basic metallurgical research for higher temperatures. In this way, B&W is helping America's utilities meet increased demands for abundant, economical electricity.

The Babcock & Wilcox Company, Boiler Division, Barberton, Ohio.

G-901-CS

*Ohio Valley Electric Corporation and its subsidiary, Indiana-Kentucky Electric Corporation, sponsored by these companies:

Appalachian Power Company[a] • The Cincinnati Gas & Electric Company Columbus and Southern Ohio Electric Company • The Dayton Power and Light Company • Indiana & Michigan Electric Company[a] • Kentucky Utilities Company • Louisville Gas and Electric Company • Monongahela Power Company[b] Ohio Edison Company • Ohio Power Company[a] • Pennsylvania Power Company[c] • The Potomac Edison Company[b] • Southern Indiana Gas and Electric Company • The Toledo Edison Company • West Penn Power Company[b]

[a]Subsidiary of American Electric Power Co. [b]Subsidiary of The West Penn Electric Co. [c]Subsidiary of Ohio Edison Co.

BABCOCK & WILCOX

BOILER DIVISION

It's no secret that when coated fasteners are processed to obtain clean threads, some of the protective coating is lost. The result? Fasteners corrode *faster* than the tower members.

But fasteners coated with Bethalume—Bethlehem's new hot-dip aluminum coating—resist corrosion *longer* than the tower members.

The reason's simple. The Bethalume coating (which arms the steel with a durable, uniform layer of aluminum) has such excellent protective ability, that even after the necessary centrifuging operation to insure clean threads, there is more than adequate protection to enable the fasteners to outlast the tower members.

The results? Less rust-drip. You save the cost of touching-up. There's a safety factor to consider too. The decision to shut off power, or have painters work under hot lines, need not be made.

If you would like to know more about how Bethalume-coated bolts can hold down tower maintenance, just get in touch with your nearest Bethlehem office.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

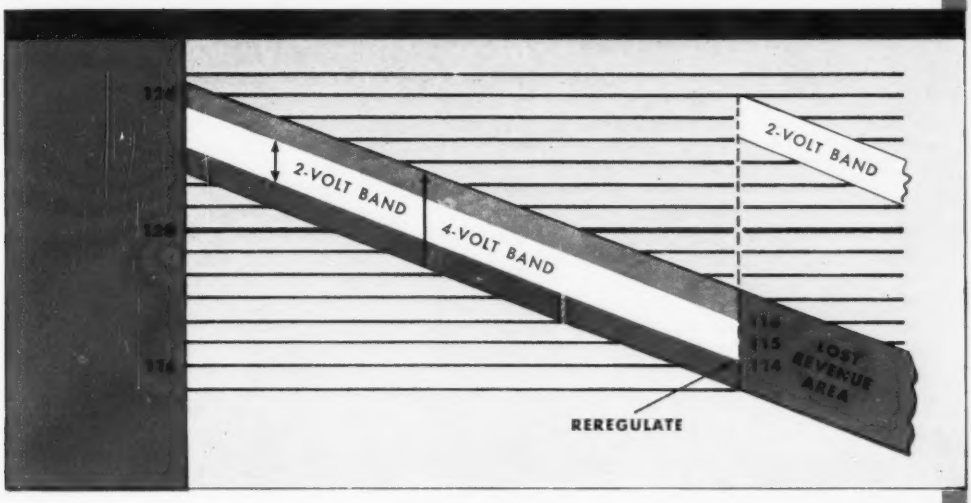
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

ALLIS-CHALMERS — 25 years of 5/8% Regulator Leadership

Losing revenue?



Here are 4 steps to increased revenue!

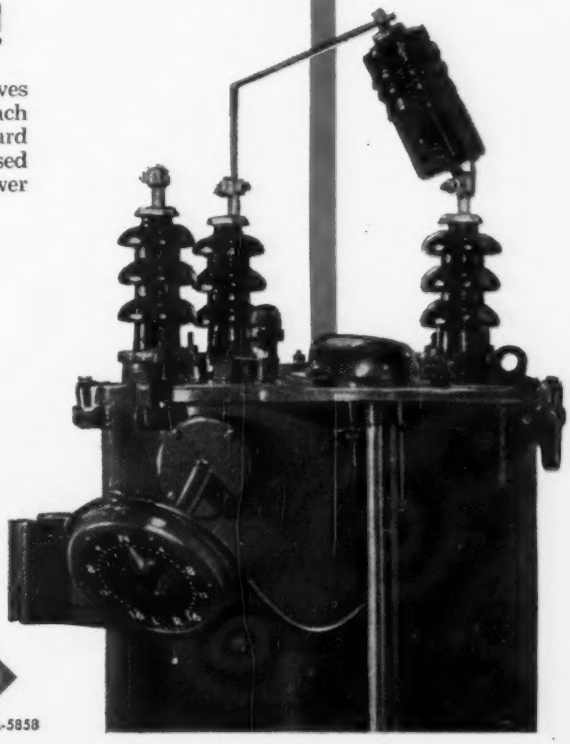
"Engineered regulation" provides added revenue — improves service while cutting regulation cost as much as 50%. Each single volt increase in average voltage on a feeder (toward the optimum) means $1 per customer per year increased revenue. At the same time "engineered regulation" is lower cost regulation.

Four basic steps are:

1. **Cut band width to two volts.**
2. **Reregulate feeders.**
3. **Use low-cost 5/8% step regulators.**
4. **Engineer to *fully* utilize *Vari-Amp*.**

Allis-Chalmers leadership and engineering experience are ready to help you work out a four-step regulator program.

Contact your nearby Allis-Chalmers office, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.



Originators of 5/8% Step Regulators

ALLIS-CHALMERS

Vari-Amp is an Allis-Chalmers trademark.

A-5858

FOR ALL-WEATHER SERVICE

Specify Kerite Cable

The arithmetic of self-supporting aerial cable can never, unfortunately, ignore the weather nor Nature's way of making trees grow where overhead lines would rather be.

Moral: When you decide to invest in the protection of insulated aerial cable, make sure that it's there to stay, to resist the elements until long after the installation has paid for itself.

Check back on your own company's records of aerial cable performance and you'll probably find—as have progressive companies the country over—that dependable Kerite insulation lasts longer, and pays its way better.

The arithmetic of aerial cable—so fundamental, so simple.

KERITE CABLE

it's the **KERITE** *that makes the difference*

Our headquarters is at 30 Church St., New York 7.

BRANCHES IN
Ardmore, Pa., Boston, Cleveland, Chicago, Houston, St. Louis, San Francisco, Glendale, Cal.

Editorial Comment

JANUARY 12, 1959

Could Electric Companies Take Initiative?

The Eighty-sixth Congress is preparing to get down to serious business in Washington this month. Based on the election returns it doesn't take much imagination or insight to predict the type of legislation that will be forthcoming. Bills affecting the power industry will include more expenditures for federal power projects, more participation of the federal government in the nuclear energy field, and many other schemes to make power production more a government function and less a private enterprise business.

The bills may be the exact ones that were unsuccessfully submitted in previous sessions of Congress or they may have a new wrinkle. But they will all have one thing in common—they will put electric utility companies on the defensive. The utility industry will be forced to enumerate the bad features of the bills—and we are sure they will be many—and unfortunately present themselves in a negative light.

Perhaps it would be better if the utility industry would sponsor or suggest some legislation in these critical areas. Undoubtedly such action would not close the flood gates of big-government legislation but it might at least check the flow. Equally important it would present an opportunity for the industry to take the initiative and perhaps make the most of a bad situation.

The recent announcement that 50 utilities would sponsor a high temperature, gas-cooled reactor power plant in response to a government invitation is an excellent example of positive action. Couldn't the electric utility industry transpose this initiative into the purely legislative field?

'Power and Progress'—A Big Step Forward

A booklet just published by Edison Electric Institute deserves warm plaudits for EEI's Committee on Relations With Educational Institutions, the staff members, and the power companies who put it together. Called "Power and Progress," the 36-page illustrated booklet is a fact-filled, well-written, positive statement on the industry's beginnings and development, and provides a look at the potential of the future. It is the best effort to date by EEI in getting a complex story across to the general public.

We're hopeful that "Power and Progress" will be the first step in a series of publications designed to acquaint varied publics with the industry's accomplishments, its technological problems, and its prospects for the future. The series might include comparable treatment on producing electricity from the atom, the story behind the winners of the Claude E. Matthews Awards, the varied roles of men and women who provide the high quality service of power companies, and a "Power and Progress" written for the junior high school student.

Winter Peaks Close to Estimates

Company	1958 Winter Peak Load Kw	Increase Over 1957–58 Winter Peak Kw	%	% Over Predicted Winter Peak	% Over 1958 Summer Peak
Alabama Power Co	1,503,700	97,100	6.9	−0.5	− 8.5
American Electric Power System	4,331,000	380,000	9.6	0.7	12.1
Arizona Public Service Co	357,000	19,000	5.0	.....	−35.0
Arkansas Power & Light Co	677,000	−46,000	−6.4	−6.4	−15.8
Atlantic City Electric Co	277,600	18,300	7.1	−3.6	− 5.6
baltimore Gas & Electric Co	961,000	30,000	3.2	−2.3	1.1
Boston Edison Co	915,600	86,200	10.4	−1.8	19.6
California Electric Power Co	243,600	35,450	17.0	−5.2	−15.2
Carolina Power & Light Co	1,048,000	59,000	6.0	−2.0	1.0
Central Hudson Gas & Elec Corp	234,700	22,700	10.7	5.7	8.7
Central Maine Power Co	388,300	32,500	9.3	−0.7	13.0
Central Vermont Public Service Corp	105,800	8,600	8.8	2.5	17.7
Cleveland Electric Illuminating Co	1,333,000	55,000	4.3	−0.5	10.0
Commonwealth Edison Co	4,100,000	326,000	8.6	0.2	5.0
Connecticut Light & Power Co	746,000	66,000	9.7	0.0	21.5
Consolidated Edison Co	3,517,000	181,000	5.4	0.5	0.5
Consumers Power Co	1,739,000	107,000	6.6	−5.2	17.9
Delaware Power & Light Co	363,400	22,300	6.5	−1.2	− 0.4
Detroit Edison Co	2,603,000	57,000	2.2	−6.0	14.3
Duke Power Co	2,306,500	149,500	6.9	−1.2	0.8
Duquesne Light Co	1,092,000	1,500	0.1	2.0	4.6
EEInc & OVEC	2,924,400	−202,000	−6.9	0.0	2.0
Florida Power & Light Co	1,142,000	−58,700	−4.9	−11.7	4.7
Florida Power Corp	551,000	−9,000	−1.6	−10.3	21.4
General Public Utilities Corp	1,923,700	113,000	6.2	1.4	14.0
Georgia Power Co	1,964,100	117,100	6.3	1.1	− 8.2
Hartford Elec Light	364,300	35,400	10.8	0.7	24.3
Houston Lighting & Power Co	1,086,300	12,600	1.2	−10.5	−31.8
Idaho Power Co	455,000	37,000	8.9	2.2	− 0.8
Indianapolis Power & Light Co	532,000	15,000	3.4	4.0	− 3.3
Iowa Power & Light Co	254,900	19,600	8.3	−5.9	− 7.6
Kansas City Power & Light Co	547,000	24,000	4.6	−0.5	−22.3
Kansas Gas & Electric Co	362,500	23,900	7.1	−1.8	−20.0
Long Island Lighting Co	912,100	98,100	12.1	−3.0	31.3
Los Angeles Dept Water & Power	1,435,000	89,000	6.6	−1.7	18.1
Louisiana Power & Light Co	357,000	22,000	6.6	.....	−22.3
Mississippi Power Co	197,700	10,400	5.6	0.4	−23.8
Mississippi Power & Light Co	305,000	18,000	6.3	.....	−22.4
Montana Power Co	515,000	27,000	5.5	−11.2	20.0
New England Electric System	1,386,000	99,000	7.1	0.6	14.7
New Orleans Public Service Inc	233,000	4,000	1.7	−11.0	−36.2
N. Y. State Electric & Gas Corp	775,100	47,900	6.6	−0.2	23.8
Niagara Mohawk Power Corp	2,834,000	154,300	5.8	−1.5	19.4
Northern States Power Co	1,289,800	67,600	5.5	0.1	10.2
Ohio Edison System	1,508,000	61,200	4.2	−5.7	9.9
Oklahoma Gas & Electric Co	523,800	47,300	9.9	3.7	−26.9
Pacific Gas & Electric Co	4,010,700	104,300	2.7	−1.3	− 0.2
Pacific Power & Light Co	884,800	70,800	8.7	−0.5	25.5
Pennsylvania Power & Light Co	1,283,500	28,100	2.2	−0.5	5.2
Philadelphia Electric Co	2,306,000	82,000	3.7	−3.5	4.6
Portland General Electric Co	793,000	11,000	1.4	−2.7	28.9
Potomac Electric Power Co	822,000	46,000	5.9	1.2	−20.0
Public Service Co of Colorado	591,300	41,700	7.6	.....	.....
Public Service Co of New Hampshire	291,800	29,900	11.4	−0.7	14.3
Public Service Co of New Mexico	145,700	11,200	8.3	−3.5	11.3
Public Service Electric & Gas Co	2,349,000	179,000	8.2	−2.1	4.0
Puget Sound Power & Light Co	601,000	68,600	12.9	1.7	35.4
Seattle City Dept of Lighting	821,000	48,000	6.2	5.0	51.5
South Carolina Electric & Gas Co	494,000	52,000	11.8	−5.5	−5.2
Southern California Edison Co	2,962,000	329,200	12.5	3.6	5.3
Southwestern Public Service Co	544,500	47,500	9.6	1.9	−17.0
Tennessee Valley Authority	9,218,000	−200,000	−2.1	−2.5	20.8
Union Electric Co	1,346,000	76,000	6.0	1.0	−11.7
Utah Power & Light Co	557,400	11,700	2.1	−16.1	6.3
Virginia Electric & Power Co	1,424,000	117,000	8.9	1.0	− 1.1
Washington Water Power Co	571,000	6,000	1.1	−5.9	26.9
West Penn Electric System	1,576,000	71,000	4.7	−1.2	9.4
Western Mass Electric Co	262,900	6,500	2.5	1.5	14.8
Wisconsin Electric Power Co	1,083,700	49,600	4.8	−0.7	10.4
	88,161,200	3,868,900	4.4	.....	.....

Absence of temperature extremes keeps peaks near estimates for 90 utilities. Mixed reactions exist on amount of industrial recovery

Utility winter peak loads were close to estimated figures in the pre-Christmas peak-load period of 1958. Temperatures close to the seasonal averages and slight increases in industrial activity were responsible for new highs, with most companies within 2% of estimated peaks.

Weather Affects Peaks

Temperature is becoming more of a factor in determining peak loads for more companies. Twelve utilities reported that weather conditions were the primary factors in determining their peaks. Generally, temperatures were lower than normal in the Midwest and Northeast, while parts of the South and West felt that temperatures were somewhat higher. No extremes were reported, however.

This round-up of winter peak data is based on an informal Electrical World survey of 90 Class I utilities which reported non-coincident peaks totalling 88,161,200 kw. This peak represents an increase of 3,868,900 kw, or 4.4% above the corresponding previous winter peak. The total peak figure was about 98.0% of the sum of individual peak load estimates.

December Peaks Normal

Almost all peak loads reported occurred between December 8 and 25, although eight Western utilities had peaks in November. At least four of these expect a higher peak in January.

Two Florida power companies also expect their peaks to fall in the January-March period. The Cleveland Electric Illuminating Co also reported a November peak, noting that the weather was extremely dark at the time of the peak.

The two Mondays before Christmas, December 15 and 22, accounted for most of the peaks.

Thirteen companies reported peaks on December 15, while 16 had peaks a week later.

Reactions were mixed as to the extent of industrial recovery from the recent recession. A number holding that business is improving was counterbalanced by an almost equal number of the opinion that industrial activity is still low. Nonferrous metals and lumber were specifically mentioned as not having fully recovered.

Strikes Reduce Peaks

Strikes hurt two of the responding utilities, who felt that a record peak might otherwise have been obtained. Outage of a basic phosphorous furnace reduced the peak for another company.

The combination of cool weather last summer and recent low temperatures produced winter peaks higher than last summer's for several companies that expect to have summer peaks from now on. Consolidated Edison Co had a December peak slightly higher than that of the past summer and attributes the apparent change to unusual weather conditions. Public Service Electric & Gas Co similarly had a recent peak, but is in a period of transition to summer peaks, which the company feels will soon predominate.

Summer Trend Continues

The trend to summer peak loads continues, although at a slower pace than in the past. Delaware Power & Light Co expects that summer peaks may soon become normal. Commonwealth Edison Co still feels that it is in a transitional stage and either a summer or winter peak may be expected. New England has yet to feel the full effect of summer loads. New England Electric System sees no evidence that the summer peak is gaining relative to the winter peak.

The majority of utilities answering the survey still have their annual peak loads in the pre-Christmas period. Most of these expect to continue to have winter peaks in the foreseeable future.

A number of utilities suggested that future winter peaks would be less likely to occur prior to Christmas. As loads become more temperature-sensitive, the effect of the holidays may diminish.

ECAP Ad Issues Unresolved

Full FP Commission will decide whether ads are in the area of political controversy or reasonable business expense

The next round in the Federal Power Commission's complaint against how 76 utilities accounted for contributions to a 1957 Electric Companies Advertising Program series will be fought before the full commission.

At that time, the FPC will be asked to rule on the scope of issues involved in its complaint, filed Aug. 1, 1957, against utility contributions for nine ECAP ads. FPC Examiner Edward B. Marsh agreed to appeal to the commission on the opening day of last week's hearing after attorneys for the FPC staff and the private companies could not agree on the issues involved.

Staff Counsel Leonard Eesley contended that the "sole issue" in the case is whether the nine ads (dealing with the private-vs-public power issue) are directed to an "area of political controversy." If such a determination is made, Eesley claims that the ads should then be placed in an accounting category "below the line" (after taxes are figured), payable out of earned surplus. Advertisements are accounted for now as tax deductible business expenses. Eesley added that any broader testimony by the power companies would be challenged as irrelevant.

A. J. G. Priest, principal counsel for 59 of the defendant utilities, claimed the ads were "ordinary, necessary, just and reasonable" business expenses. He refuted Eesley's "narrow" interpretation of the issues.

The procedure leading to the appeal followed true to form, as predicted in a December pre-hearing conference (EW, Dec. 15, p 28). Marsh gave the staff and private companies until Jan. 21 to file memoranda for submission to the full commission and he set Feb. 3 as a deadline for replies.

Priest appeared willing to admit that the nine ads in question were politically controversial. However, attorneys for Oklahoma Gas & Electric Co and Southwestern Electric Power Co testified they would not make such an admission.

Economist Scores TVA's Scope

Sharply contrasting viewpoints on the Tennessee Valley Authority emanated from the region last month. On the one hand, the agency's annual report for fiscal 1958 glowingly points out that "the formative years of Tennessee River development" are ending and that the area is entering a period of "accelerated economic growth..."

On the other hand, Dean Russell, economist and author of "The TVA Idea," scored the "before and after" comparisons of the area's growth and caustically appraised the "yardstick" argument used by TVA backers.

In its report, the agency says, "Development of the river has created a number of additional channels of potential development not fully envisioned by the founders of TVA." However, statistics for the fiscal year indicated a general decline in power sales and revenues. TVA also reported that it will have a "slight margin" of capacity over requirements through the winter of 1960-61, when seven new generating units now under construction are completed.

TVA's generating capacity was increased by 332,725 kw during fiscal 1958 to a record total capacity of 10,222,210 kw—6,494,750 kw steam and 3,727,460 kw hydro. In addition, the seven steam units under construction will add another

1,535,000 kw of capacity, the report said.

TVA generated 60.8-billion kwhr of energy in fiscal 1958, down from 61.4-billion kwhr a year earlier. The 1958 total included a record high of 19.3-billion kwhr of hydro generation, while steam accounted for 41.5-billion kwhr, down from 44.7-billion kwhr during fiscal 1957.

Wholesale power sales totaled 56.7-billion kwhr, down from 57-billion a year earlier. TVA sales to government agencies (including the Atomic Energy Commission) declined during the year, while industrial, municipal, co-op and other retail distributors increased their purchases.

TVA's gross power revenues were $233.5 million, down from $234.9 million in fiscal 1957. Net income totaled $55 million in fiscal 1958—a return of 3.6% on TVA's $1.53 billion investment—also falling below the average return of 4%, the report added.

For the first time since WW II, TVA won't pay to the U. S. Treasury any revenues collected from power operations during this fiscal year.

Economist Dean Russell's comments were directed to law school seniors of Vanderbilt University in Nashville. He started by saying TVA isn't a "yardstick" by which to measure private power accomplishments, but simply the federal government doing what it wants.

The unfair advantages which he said TVA enjoys keep it from being an accurate yardstick, Russell said. This includes no payment of federal income or state taxes—although TVA pays a "fairly large sum" in lieu of state taxes—and no payment of interest on money it uses.

"Using standard accounting methods, and allowing for all three factors which you have to consider for private power rates, I have discovered that TVA power costs one-third higher than power from private utilities in the surrounding area," he said.

"When the private power companies protested government competition, they were told by the TVA counsel in 1937 that steam plants would never be used," he said. "Today, 75% of TVA's power is steam-generated, and in the future it may run as high as 95%. If this had been known at the time TVA was adopted, it would never have come into being."

Russell said he was "distressed" by the "before and after" arguments of TVA backers. Why not credit Con Edison for New York City's booming economy, he asked.

In actual fact, he said, TVA is probably responsible for "one hundredth of one per cent of Tennessee's progress just as Consolidated Edison is responsible for "one hundredth of one per cent" of New York City's.

"What I like to think about is where Tennessee might be if it hadn't been saddled with TVA," he said. "Look at the economic conditions in the surrounding states. If it were not for TVA, Tennessee might easily be the equal of Georgia or southern Mississippi or parts of Texas.

GE Re-assigns Dozen Departments

Dissolution of two product divisions of General Electric Co and reassignment of their 12 component departments among six other divisions took effect Jan. 1 in shifts designed to increase efficiency.

The two divisions dissolved are the Measurements and Industrial Products in West Lynn, Mass., and Construction Materials, Bridgeport, Conn.

The Measurements and Industrial Products Div was headed by Harold E. Strang, vice president. Strang has been appointed consulting engineer, Industrial Electronics Div, reporting to Harold O. Strickland, Jr, newly-named vice president who heads Industrial Electronics Div.

Departments of the Measurements and Industrial Products Div will be assigned as follows:

Industrial Heating, Shelbyville, Ind., to Motor and Generator Div.

Meter, Somersworth, N. H., to Transformer Div, Pittsfield, headed by R. W. Smith, new vice-president.

Instrument, West Lynn, Mass., assigned to Industrial Electronics Div, except for instrument transformers which will be made by the Meter Dept.

Outdoor Lighting, Hendersonville, N. C., to Lamp Div, Cleveland.

In addition, the Industry Control Dept, Roanoke, Va., has been assigned from Switchgear and Control Div, Philadelphia, to Industrial Electronics Div, New York.

The Construction Materials Div was formerly headed by C. H. Black, vice-president, who will serve temporarily on special assignment. He will report to R. L. Gibson, vice-president and general manager of the Chemical and Metallurgical Div. Gibson recently announced formation of a new Insulation Materials Dept.

These Construction Materials Div departments have been reassigned to the Chemical and Metallurgical Div, which will be moved to Bridgeport:

Conduit Products, Wire and Cable, Wiring Devices, Sales Relations and Utilities, and Legal.

The Accessory Equipment Dept will come under the Component Products Div.

Anaconda Firms Merge for Integrated Operation

Anaconda Aluminum Co, a wholly-owned subsidiary of Anaconda Co, has been expanded by the merger of other wholly-owned Anaconda subsidiaries — American Aluminum Co and Cochran Foil Corp. Archie P. Cochran, former and founder of Cochran Foil Co, has been elected president of Anaconda Aluminum. Executive offices of the subsidiary will be at Louisville, Ky.

Clyde E. Weed, board chairman of the parent company, in making known the organization expansion, reports the subsidiary has assets totaling over $140 million. He stated that Anaconda Aluminum, as a result of the merger, will be essentially an integrated organization, embracing each phase of aluminum production from the reduction of alumina to pig and ingot through to fabrication of such commercial products as rod, sheet, extrusion, foil, etc., thereby becoming an important source of supply to users of aluminum.

Atomic Progress

• Two important test reactors achieve criticality

Two test reactors that will contribute to a better understanding of the atomic power art went critical last month. A General Electric Co Test Reactor (GETR) at Vallecitos Atomic Laboratory will produce 30,000 kw of heat for testing of materials under intense nuclear irradiations. The Atomic Energy Commission started the Special Power Excursion Reactor Test No. 3 (SPERT-III) at the national testing station near Arco, Idaho, for basic explanations on reactor behavior under runaway conditions.

GE's facility initially will be used for irradiating test fuel elements for nuclear power reactors, the company said. Space is provided for tests on other reactor components, plus materials used in other industries and government projects.

The $4-million project, called the first large privately financed materials testing reactor in the U. S., can simulate long periods of radiation exposure in a matter of hours. The GETR design "combines the advantages of high specific power of the tank-type reactor with the large experimental space of pool-type reactors," GE said.

The reactor is a pressurized light water cooled type with a high-power density in the core. Light water and beryllium are used as moderators. The 3-ft long core is contained in a 2-ft dia aluminum pressure vessel.

SPERT-III was built for the AEC by Paul Hardeman, Inc, of Los Angeles. Phillips Petroleum Co, operators of the plant, furnished the conceptual design and Stearns-Roger Mfg Co, Denver, handled the detailed design.

Classified as a high-pressure, high-temperature, light-water moderated and cooled reactor, SPERT-III possesses a versatility which "will enable the performance of transient tests under various initial conditions of pressure, temperature, and coolant flow," the AEC said. Pressures from atmospheric to 2,500 psi, and water temperatures from 68 deg F to 668 deg F are possible. Coolant flow rates range from zero to 20,000 gpm, with heat removal capacities up to 60,000 kw.

SPERT-III is operated from a control center ½ mi away from the $3.5-million facility. It is fueled with highly enriched uranium.

• U. S. completed 37 reactors, started 45 last year

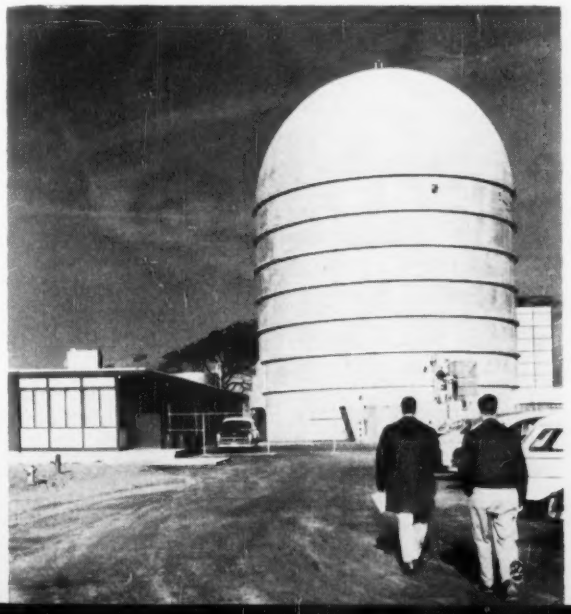
Last year was an active one for the U. S. atomic industry. The U. S. finished 37 reactors in this country and abroad and construction was started on 45 more, according to an Atomic Industrial Forum report.

Among reactors completed this year were a 200-kw boiling water power-and-space-heat reactor that will supply remote Army bases, and two test reactors having importance for nuclear plants of the future (see below). Naval projects and relatively small research and training devices made up the remainder of reactors completed.

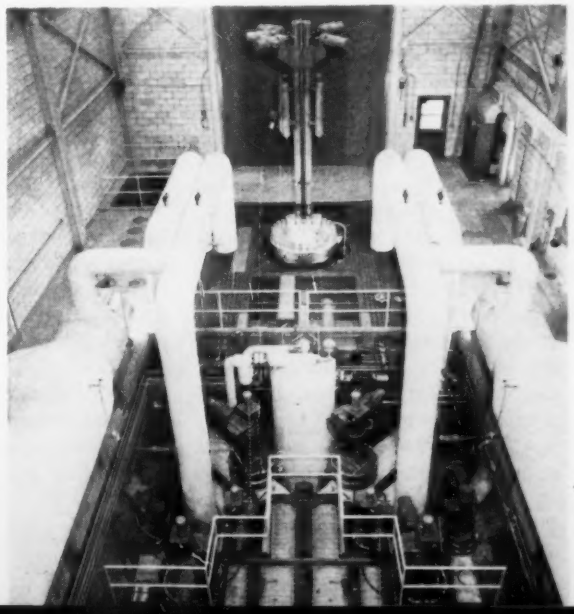
Ground breaking took place in 1958 on a 75-Mw sodium graphite reactor for Consumers Public Power District, a 22-Mw boiling water reactor for Rural Cooperative Power Association, and a 1.7-Mw pressurized power-and-space-heat reactor for the Army Corps of Engineers at Ft. Greeley, Alaska.

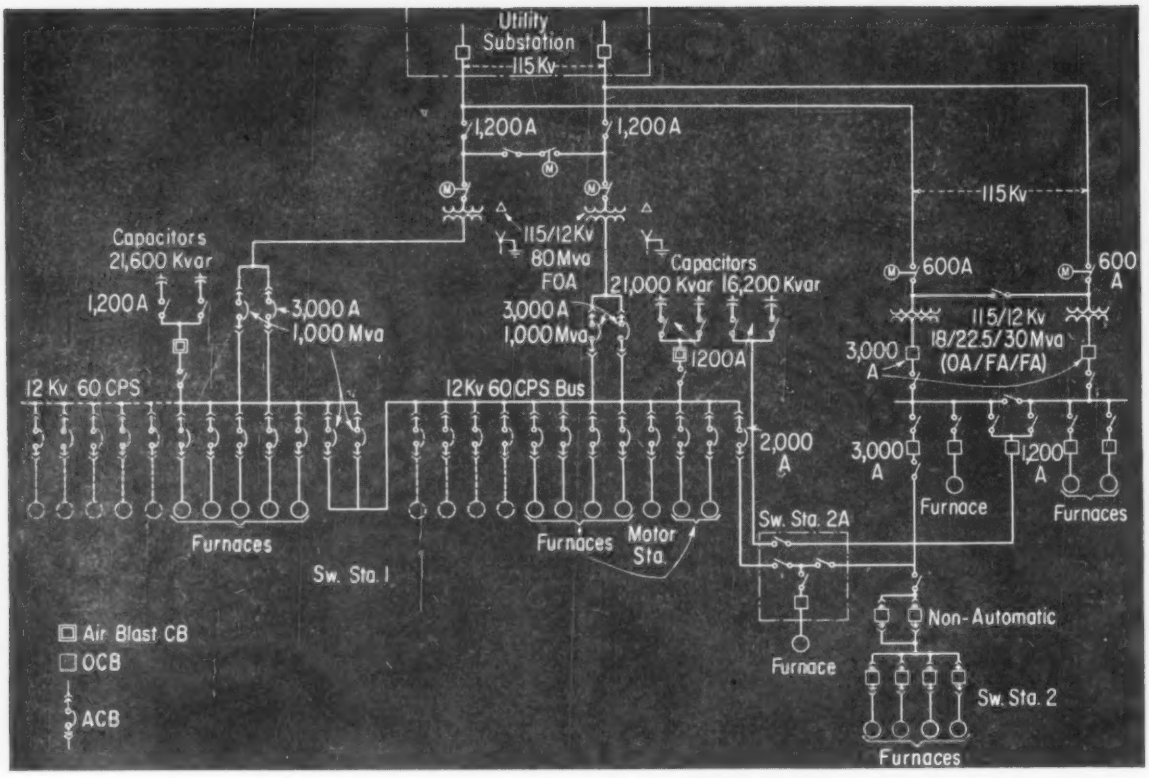
Construction continued on five major projects aggregating 597-Mw capacity which will be completed by the end of 1960. These include reactors for Commonwealth Edison Co, Consolidated Edison Co of New York, Inc, Yankee Atomic Electric Co, Power Reactor Development Co, and Argonne National Laboratory. Development work continued in '58 on projects totaling 155 Mw.

GETR BUILDINGS include steel cylindrical containment vessel that is 66 ft in dia and 105 ft high and has four floors



SPERT-III FACILITY view shows reactor top and control rod drive mechanism, top center, horizontal heat exchangers





New 160-Mva substation, with 115-kv supply, and new switchgear . . .

Electro Met Converts 175-Mw Load

THEODORE A. LEEDS, Design Engineer, Electro Metallurgical Co, Niagara Falls, N. Y.

The conversion of a 175-Mw load from a 25- to a 60-cps supply is now in process at the Electro Metallurgical Co, a division of Union Carbide Corp, in Niagara Falls. The changeover includes construction of a new 160-kva, 115/12-kv substation, installation of new 12-kv switchgear and secondary transformers, and the conversion of a number of large furnaces to 60-cps operation. Control of new and existing substations will be centralized in the main control room and will include a new supervisory control system for part of the system. Approximately 60,000 kvar of manually switched static capacitors are being installed to raise operating p.f. to 95%.

Although the system has to be installed without disturbing much existing 25-cps equipment, it involves very little compromise and is much as it would be if designed from the beginning.

The largest portion of the load, about 165,000 kw is composed of submerged arc electric furnaces, used to produce ferro-alloys and alloying metals. The remaining 10,000 kw is 440-v power and 115-v lighting load.

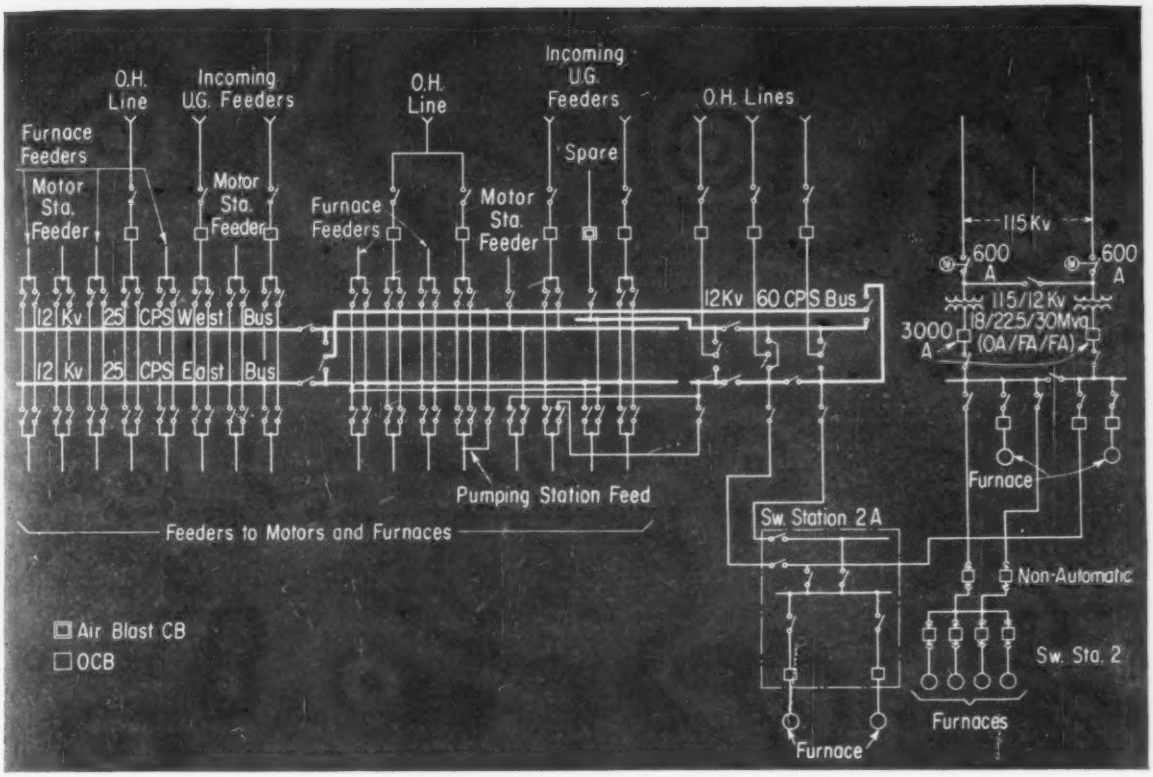
Furnaces Served At 12 Kv

The low reactance, 25-cps was particularly attractive for the furnace load. Consequently, all the furnaces were designed for this frequency, even after 60-cps power became available. Since the power and lighting load was only a small percentage of the total plant load, and because there was an abundance of reliable 25-cps power in the past, motor and lighting loads were also expanded at 25 cps, in spite of the lower cost and slightly higher efficiency of 60-cps.

Power was delivered to the furnace transformers directly at the 12-kv supply. There was a sizeable installation of 12-kv switching equipment. The equipment provided a great deal of flexibility and very satisfactory operation. Thus there was no operating or economic reason for converting it while 25-cps power was abundant.

However, when a large amount of additional power was needed in 1951, it was found that additional 25-cps would be about twice the cost of 60-cps power. Since some of the furnaces could be readily converted to 60 cps, a 60-Mva substation, with two 30-Mva transformer banks, was installed to take service for the additional load at 115 kv, 60-cps.

When the Schoellkopf Station at Niagara Falls was destroyed by a rock slide in June, 1956, Electro Metallurgical lost about 50,800 kw



eplace 12-kv supply and oil circuit breakers as . . .

From 25 to 60-Cps Distribution

of 25-cps. A study of partial 25- to 60-cps conversion had been started some years earlier, but we assumed that some 25-cps power would remain available for an indeterminate period and that complete conversion would not be necessary. Moreover, these studies had been suspended and the 60-cps substation was de-energized when production requirements decreased shortly thereafter. Now complete conversion was mandatory.

With the 60-cps service, Electro Metallurgical Co could no longer be supplied at our 12-kv utilization voltage. In the quantities we required, power could be delivered only at 115 kv. Although the electric utility could provide stepdown transformers for a substation, the premium for this was too great.

However, before we could proceed with our own design, it was necessary to estimate the future expansion at the Niagara works and establish a maximum future load in order to select the proper transformer sizes. In turn, the future expansion depended on indeterminate future power costs.

Balanced Load Required

Since we will be supplied by two 115-kv lines, and the power company requires a fairly evenly balanced load under normal conditions, we had to have an even number of transformers. Each of the two 115-kv lines has sufficient capacity to carry the entire plant load.

Two 80,000-kva, 3-phase transformers were selected to meet the estimated requirements and subsequent planning was continued on this basis. This capacity is in addition to the 60-Mva, 60-cps substation which is again in service. Although the two substations are some distance apart, they are fed from the same pair of 115-kv feeders.

Any load increases above this estimated ultimate plant load, 220 Mva, could be obtained only at a cost which would be prohibitive for anything other than a major increase. Present planning indicates a total of about 30,000 kva transformer capacity in excess of connected furnace load.

The interrupting capacity of the existing 12-kv power switching equipment, an indoor installation of large, cell-mounted oil circuit breakers, was far below the requirements of the new 60-cps system. Since the two 80-Mva transformers cannot be paralleled on the 12-kv side, it was decided that 750-Mva metalclad switchgear would be entirely adequate. Parallel operation with 1,000-Mva switchgear was considered but discarded because the breaker capacity would not be adequate, although several expedients that would take care of this were possible. Secondly, our substation is so close to the power

company substation that with parallel operation we would have to use step distance relays for secondary protection. We could not justify the extra cost to obtain parallel operation.

Since the rated secondary current of each transformer is 3,850 amp, the transformer secondary breakers had to have continuous ratings of at least 4,000 amp. Such breakers were not available in 750-Mva ratings. Although we do not like to use breakers in parallel, we were forced to consider using two 2,000-amp, the highest available 750-Mva rating. Forced air cooling would boost the rating to 2,500 amp each, to provide for occasional overloading of the transformer and to take care of any unequal division of current between the breakers, which would at times be operated near their rating.

3,000-Amp Breakers Paralleled

It was then suggested that we use two 3,000-amp 1,000-Mva breakers in parallel, instead of the forced air-cooled 2,000-amp, 750-Mva units. The extra cost was very little and it was no great problem to integrate the 1,000-Mva breakers into the line-up of 750-Mva switchgear. Thus, although we were forced to use parallel breaker operation, we had the compensating advantage of being able to maintain the breakers one at a time, with a 75% load on the transformer.

With the new switchgear, some problems in terminating the cabling system arose. The existing underground system consists of paper-insulated, lead-covered cables, which do not require replacement. Some furnaces have as many as four 500-Mcm, 3 conductor cables in parallel. Previously, when each circuit was fed by a breaker occupying a 15-25-ft bay, there was plenty of room for potheads and terminations. However, with new switchgear, we will have four breakers in the space formerly occupied by one. Since it is impossible to locate four potheads for such a furnace in one switchgear unit, the lead-covered cable will be spliced to rubber-insulated cable in the basement. The rubber-insulated cable will then be terminated in the switchgear, eliminating potheads.

One major problem was developing a scheme for installing new switchgear in the space already occupied by the existing 25-cps gear without interrupting more than one furnace at a time. This involved careful scheduling, temporary installations, a step-by-step construction procedure with some unavoidable lost time between steps, together with several interruptions to furnaces not being converted at that particular time. Such a procedure would be very costly from a construction standpoint.

Extensive changes are necessary to enable some of the furnaces to operate on 60 cps. The busbar system will have forced ventilation. The interlaced sections of the busbars must be extended as far as possible to the furnace electrodes. The flexible connections which carry current from the bus to the furnace electrodes must also be changed. Some of the ordinary steel portions of the furnace covers must be replaced with non-magnetic steel to reduce power losses and localized heating induced by current flowing into the electrodes.

With the present secondary conductor systems, the operating power factor on 60 cps would be so low as to be prohibitive. Even after conversion, it will still be only about 84%. To assure an operating power factor of 95% for billing purposes, large banks of manually switched static capacitors will be installed. Our operation is a 24-hr per day, seven day per week schedule and an automatic switching scheme is not necessary. Estimated savings in power costs will pay for capacitors in 2½ years.

Because the new switchgear is so much smaller than the circuit breakers it replaces, there is room indoors for the capacitor banks. In addition, an outdoor capacitor installation in our industrial environment would require metal-clad housing, at an appreciably high cost.

Centralize Substation Control

Control of the new 60-cps substation will be centralized in the main control room of the plant, along with the 25-cps equipment. Since this new substation is quite near the control room, it will be directly controlled. The original 60-Mva, 60-cps substation will also have its control moved to the same room, along with the controls for several furnaces in the same area, by means of a new supervisory control system.

The 115-kv overhead lines feeding the new outdoor substation will enter the plant along the same right-of-way as the present 12-kv, 25-cps lines. Since some of the 25-cps lines must remain in service until the load has been transferred to 60 cps, we are again bedeviled by the problem of having to install something in the space already occupied by another piece of equipment is installed in its place. To do this, two of the 25-cps lines may have to be rerouted temporarily. The balance of the 25-cps load can be carried by the existing underground feeders, which will remain in service after the furnaces have been converted to carry the remaining motor and lighting load. The 25 cycle overhead lines will be removed at that time.

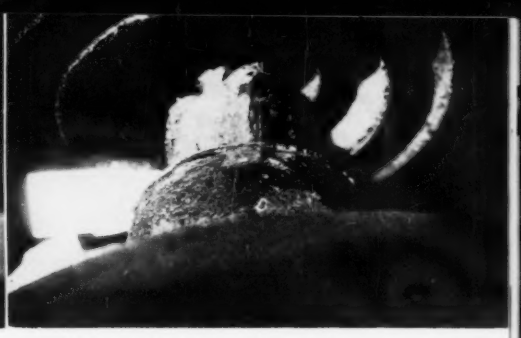
ACB's Switch Furnaces

An unusual feature of the system operation is the use of magnetic air breakers for switching the furnaces. Some of these furnaces require frequent disconnection from the power supply for operating reasons. While these are large furnaces, they are small in comparison to the utility system and do not cause any significant voltage fluctuation on the transmission lines when they are switched. Because the old 12-kv breakers were not suitable for this type of operation, unit type oil circuit breakers were originally installed on the individual furnace transformers. Several years ago we decided to replace two of the oil breakers with magnetic air breakers on a trial, although the frequency of operation and momentary current ratings we needed were in excess of any standard breaker available at that time.

Within two weeks, one breaker failed, under unusual circumstances, and was replaced. Since that time these two breakers have given outstanding service, with no maintenance whatsoever. At first they were inspected every 100 operations. Inspection periods were gradually extended until they reached 1,000 operations. To date, each breaker had performed 10,000 operations, with no replacement of parts. Seven similar breakers were recently ordered for this type of duty.

DIESEL EXHAUST leaves deposit on under side of bottom unit of string with stainless bolts

STAINLESS EYE BOLT and malleable cap in combination resist tendency of corrosion to freeze joint



WITHOUT STAINLESS EYE BOLT top and bottom units are welded solid by corrosion products

Stainless Steel Extends Insulator Life

Lackawanna Railroad tunnel near New York City is proving ground for stainless steel insulator hardware

L. J. **STEVENS** Manager—Advance Development Engineering, Insulator Department, General Electric Co

Special suspension insulator units with stainless steel eye bolts have withstood severe insulator hardware corrosion conditions for ten years without failure in the mile-long Bergen Tunnel of the Lackawanna Railroad Co, approaching New York City. Conventional suspension insulators, supporting catenary lines in the tunnel, failed by cracking of the porcelain shell in six months to a year after being put in service.

Insulation of the trolley system consisted of two units of 15,000 lb clevis-type suspension insulators hung from straps anchored in the tunnel roof. In the early years of the 3,000-v dc electrification plan, steam and electric locomotives were used in the tunnel. But most of these have been taken out of service and today Diesels and dc locomotives are used.

Study of previously failed units suggested that porcelain shells cracked in pie-shaped sections under a bursting pressure from within. The eye bolts showed abnormal corrosion around the circumference at the cement line. Corrosion products, principally ferric oxide, occupied a greater volume than the forged carbon steel eye bolt. Corrosive expansion, under the cement line continued, causing hoop tension on the porcelain shell and ultimate failure.

Chemical analysis of encrusted deposits on typical insulators shows that they contained:

7.9% carbon
4.4% sulphur
Trace of chlorides

Spectographic examination shows there was also present silicon, sodium, iron aluminum, magnesium, calcium, copper and zinc.

Conditions in the tunnel at nearly all time are very damp. Fumes from the locomotives hang on as there is no positive pressure to drive them out. The situation is not helped by the severely corrosive industrial marine atmosphere.

To reduce corrosion, trial insulators with three different grades of stainless steel eye bolts, cotter bolts and cotter keys were installed at four points of greatest hazard to the insulators on two different tracks in the tunnel. Standard caps were used on these trial units since it was felt the major source of trouble would be ball bolt corrosion. Table shows types of stainless steel used in the trial units.

Conclusions are as follows:

1. Ten-year trouble free life greatly exceeds service life of standard insulators having carbon steel bolts protected by galvanizing.

2. Porcelain part of the special units are sound mechanically and electrically as determined by a ring test. There is no evidence of cracks on either the upper or lower unit of the two unit strings. This demonstrates that lack of corrosion around the stainless steel eye bolt is the key factor in keeping insulators from failing due to internal pressures built up within the pin holes of the insulators. All insulators having stainless steel bolts are clean around the eye bolt.

3. There was some evidence of slight pitting on eyebolt with Type 430 composition. For future units, Type 410 stainless would be a better selection because it is less notch sensitive than Type 430.

4. It is not felt necessary to go to the more expensive stainless steels such as Type 302 or 316. The complete insulator can be protected up to the limit of durability of the malleable iron or forged steel cap, by using the Types 410 or 430 stainless steel eye bolts.

Properties of Stainless Steel Used In Trial Units

AISI	Per Cent Chemical Composition				Nominal Mechanical Properties			
					UTS	0.2% Y.S.	Elong.	
Type	Cr	Ni	C (max)	Mo	psi X1000	psi X1000	% in 2 in.	R of A %
302[a]	17/19	8/10	0.15	—	85	35	60	70
316[a]	16/18	10/14	0.08	2/3	80	30	60	70
430[a]	14/18	—	0.12	—	75	45	30	65
410[b]	11.5/13.5	—	0.15	—	95	65	26	67

[a] Annealed [b] Tempered (1,400 degrees F)

Computer Speeds Bus Design

Numerous alternative station bus designs are automatically checked by IBM 650 for engineering evaluation and selection

C. A. IMBURGIA, Planning and Technical Studies Engineer
H. K. AMCHIN, Computer Applications Section
S. G. VASSILIEV, Planning and Technical Studies Section, American Electric Power Service Corp, New York, N. Y.

Short-circuit stresses on generator and substation buses are being calculated on an IBM 650 digital computer with a program developed by American Electric Power Service Corp engineers. Specifically, the computer checks the adequacy of bus structures to withstand short-circuit mechanical stresses in bus supports and conductors. The computer makes the required calculations in about 1% of the time needed by a trained engineer using a slide rule or desk calculator, and provides a 4:1 cost reduction.

In addition, the computer program permits the study of an increased number of alternative layouts for each station. These studies make possible a better engineered and more economical design. The computer has been used to check the design of bus structures for six generator and substation installations to date. Computer solutions for these have averaged about $10, using this program, replacing an estimated $40 to $50 per station which would have been required for manual computations.

The program is based on an analytical method for calculating the maximum lateral force on each support and maximum stress on each span under short-circuit conditions. It takes into account not only the short-circuit current and the physical dimensions of the structure, but also the rate of current decrement, the vibratory characteristics of the busbar-insulator system, and the damping of the structural elements. The program is suitable generally for a bus of long, straight, parallel, uniform conductors with rigidly-mounted, uniform supports. The method applies whether conductors are face-on or edge-on with respect to the supports and whether the supports are stressed in bending, tension or compression.

For single span and all equal-span buses, the method considers the effect of longitudinal forces along the conductor. In structures with long spans and relatively flexible busbars, this longitudinal force may add substantially to overall stresses on the supports.

Parameters are Varied

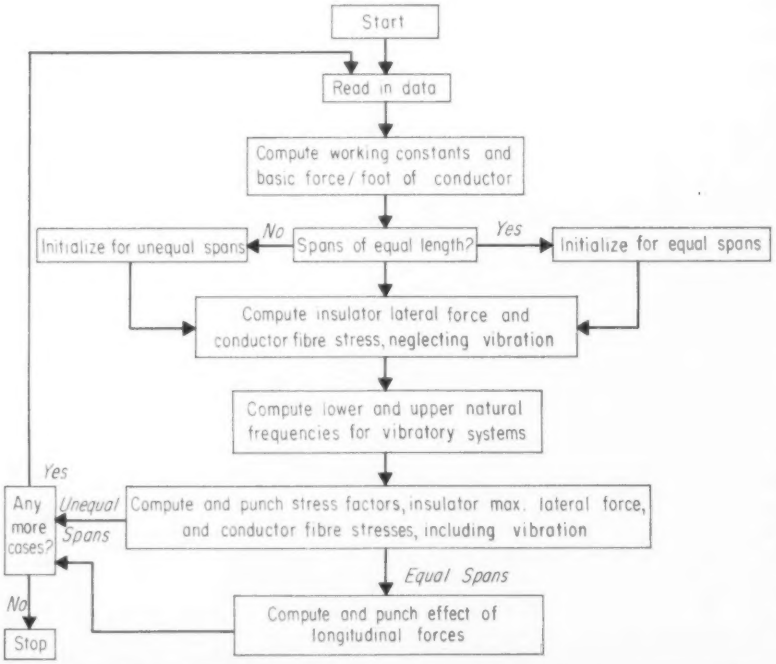
A check of the adequacy of an existing bus structure to withstand the anticipated short-circuit current ordinarily requires the running of just one case. However, determination of the most desirable bus layout for a station may require a series of cases. These may involve variations in such parameters as span length, conductor size, phase spacing and type of insulator.

System and mechanical design data for each case are entered on a special form. Data then are punched into cards which, together with the program, are loaded into the computer for processing. The program progresses automatically from case to case, thereby providing for maximum economy in computer usage.

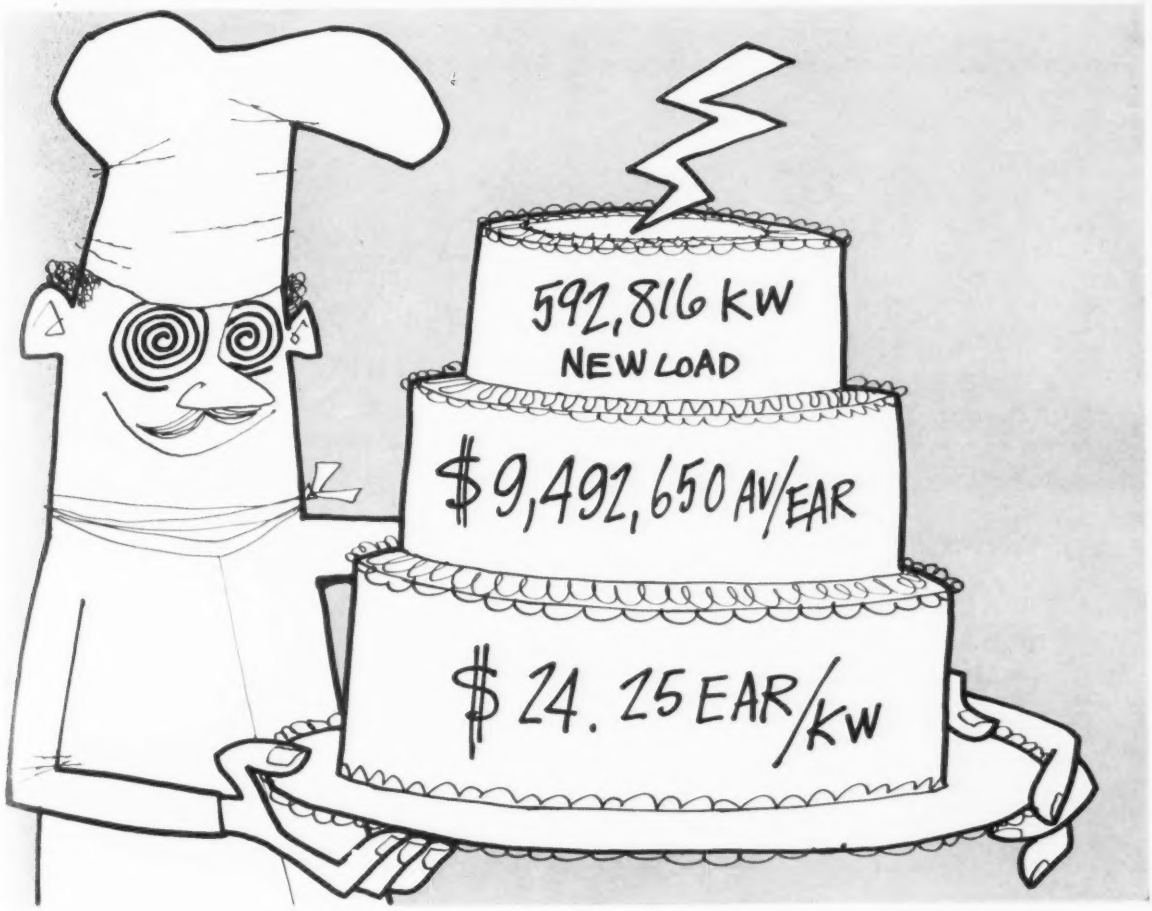
Solutions are punched in output for maximum force on each insulator and maximum fiber stress in each span. Input data are also reproduced for check and permanent record.

The program will handle up to ten unequal spans, solving a problem of this size in about 30 sec. Only about 5 sec is required for a single-span problem.

Digital computation of short-circuit stresses in bus structures brings substantial savings in engineering time by eliminating tedious long-hand calculations. But the engineer still must decide, in collaboration with the designer, on the alternatives to be tested; and choose the optimum design from two or more acceptable alternatives for present and future requirements.


Start
Read in data
Compute working constants and basic force/foot of conductor
Initialize for unequal spans
No
Spans of equal length?
Yes
Initialize for equal spans
Compute insulator lateral force and conductor fibre stress, neglecting vibration
Compute lower and upper natural frequencies for vibratory systems
Yes
Any more cases?
Unequal Spans
Compute and punch stress factors, insulator max. lateral force, and conductor fibre stresses, including vibration
Equal Spans
No
Stop
Compute and punch effect of longitudinal forces

BUS STRUCTURE DESIGN for up to ten unequal spans follows a program that gives a solution in 30 sec. The program automatically goes from case to case

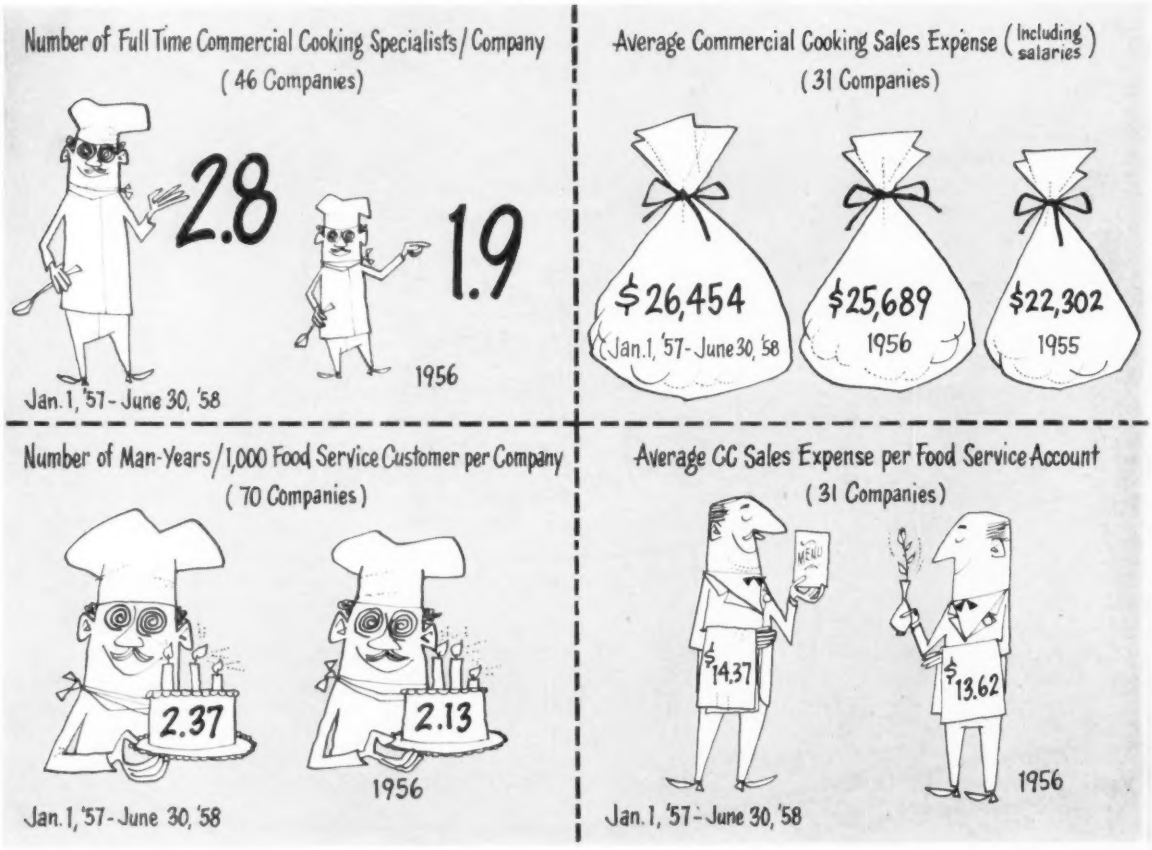


Commercial Cooking:
Load Booster in a Recession

Fourth Commercial Cooking survey shows that the load continued to grow, even during the recession, and was responsible for sustaining commercial kwhr sales generally

Commercial electric cooking is a strong load builder and sustainer in time of a recession.

During the early months of 1958, when the most serious post-World War II recession was at its worst, electric industrial loads had plummeted in almost all areas of the country, some as much as 27% below levels for comparable periods for the previous year. Residential and commercial load growth rates, though definitely below those of previous years, were at least holding their own. In many cases, they were even growing. The annual growth rate of the commercial load for the first half of 1958 was up 5.4%. One of the components of the commercial load — electric commercial cooking—was partially responsible for this good showing. For example, the findings of a recent Hotpoint Co survey covering the eighteen-months period from Jan. 1, 1957 through June 30, 1958, showed such companies as Alabama Power Co having gained some 80% of their total 1957 commercial cooking load



in the first six months of '58. Other findings of the Hotpoint survey also bear out the fact that commercial electric cooking is a good load to have anytime, recession or not. Electrical World's Fourth Commercial Cooking Special Report analyzes and interprets these Hotpoint findings.

The number of utilities responding to the Fourth commercial cooking survey was 70, four more than the Third, which covered the year 1956. These 70 utilities were asked to tabulate their commercial cooking activities, budgets, manpower and results for the year and half between Jan. 1, 1957 and June 30, 1958. Of the 70 utilities, exactly half (35) were in the 200,000-meters or above class (Division A); and 35 were in Division B (under 200,000 meters).

Utility manpower expended on commercial cooking has increased in the period covered by the survey. Forty-six of the seventy companies employ a total of 129 full-time commercial cooking specialists. This represents an average of 2.8 specialists per utility, up from the average of 1.9 for 1956. The larger companies seem to be putting in more of the manpower. Twenty-four Division A companies have 91 full-time specialists, averaging 3.8 per utility. Division B has 22 utilities. Average 1.7.

Supporting the efforts of these commercial cooking specialists are the all-purpose representatives who spend a part of their time promoting and selling the commercial cooking load. Some 64 companies have 1,081 all-purpose reps who average 16.7% of their time doing this. Breakdown: Division A has 32 companies with 799 all-purpose representatives averaging 18.6% of their time; Division B has 32 companies with 282 a-p reps who averaged 11.3% of their time on the CC load. This is the equivalent of an extra 181 man-years.

The 70 utilities reported a total of 166.06 man-years per 1,000 food-service customers. This is an average of 2.37 per company. This is up 11.2% over 1956's 2.13. If the larger utilities have been increasing the number of men to cover their growing number of food-service accounts, the smaller ones seem to be concentrating heavier on the fewer ones they have. For while Division A totals 58.15 man-years per 1,000 food-service customers for an average of 1.66 per utility, Division B totals 107.91-man years per 1,000 FS customers. Average: 3.08.

The 70 reporting companies list a total of 180,539 food-service customers or 36% of the estimated national market. Of these, 14,032 (8%) cook all-

electrically, and 76,066—42%—are equipped for partial electric cooking. Here's the breakdown:

Division A	
Total FS Customers.....	146,252
All-electric	9,506 (6%)
Partial-electric	59,123 (40%)
Division B	
Total FS Customers.....	34,287
All-electric	4,526 (13%)
Partial-electric	16,943 (49%)

Although the increase in utility manpower in the commercial cooking field may help explain why CC held its own so well during recession-ridden '58, it can only be part of the story; for the electric power suppliers also boosted the budgets.

Thirty-one companies reported a CC sales expense of $820,079. The average was $26,454, up about 3% over 1956's $25,689 and 18.5% above the 1955 level of $22,302. And these are real increases, not merely dollar boosts to offset inflated costs. They both exceed costs of living rises due to inflation during the comparable periods. Division A (11 utilities) reported a total budget of $469,000, averaging $42,633 per utility. Division B (20 utilities) totaled $351,079, for an average of $17,554.

Average commercial cooking sales expense per food-service account was $11.38 for Division A's 11 utilities, and $22.14 for the 20 in Division B. The average for all 31 companies was $14.37, an increase of 5.5% over the $13.62 spent during 1956.

The 31 utilities earned $3,105,081. Their average sales cost per $1 of CC revenue was 26¢, down 8¢ from the 34¢ spent in 1956. For "A" utilities, who earned $2,030,956, this cost averaged 23¢; for the "B" ones with $1,074,125, the cost came to 34¢.

But manpower and money do not tell the whole story either. There is also the matter of utility CC programs.

Sixty-seven of the 70 reporting utilities exposed 109 CC specialists and 1,169 all-purpose representatives to equipment manufacturers' sales education in the 18 months covered by the survey. "A" companies trained 70 specialists and 81 a-p reps; "B"

How Cooking Helped Bolster the Commercial Load

The Top Ten—January to June, 1958

Division A (200,000 meters and over)

1.	Southern Calif. Edison	15,801 kw	(59% of total 1957 results)
2.	Commonwealth Edison	12,118 kw	(57% of total 1957 results)
3.	Pennsylvania P&L	11,869 kw	(43% of total 1957 results)
4.	Appalachian Electric	8,527 kw	(51% of total 1957 results)
5.	Ohio Edison	8,331 kw	(59% of total 1957 results)
6.	Georgia Power	7,339 kw	(40% of total 1957 results)
7.	Detroit Edison	6,931 kw	(44% of total 1957 results)
8.	Duke Power	6,904 kw	(48% of total 1957 results)
9.	Carolina P&L	6,037 kw	(44% of total 1957 results)
10.	Alabama Power	5,600 kw	(80% of total 1957 results)
		Average	**52.5%**

Division B (Under 200,000 meters)

1.	Idaho Power	3,524 kw	(46% of total 1957 results)
2.	Knoxville Utilities	2,800 kw	(93% of total 1957 results)
3.	Washington Water Power	2,700 kw	(65% of total 1957 results)
4.	Utah P&L	2,400 kw	(55% of total 1957 results)
5.	Southwestern Public Service	2,194 kw	(61% of total 1957 results)
6.	Nashville Electric	2,045 kw	(77% of total 1957 results)
7.	Narragansett Electric	1,685 kw	(44% of total 1957 results)
8.	Potomac Edison	1,549 kw	(40% of total 1957 results)
9.	Elec. Pwr. Bd. Chattanooga	1,546 kw	(69% of total 1957 results)
10.	Wisconsin Pub. Serv.	1,539 kw	(61% of total 1957 results)
		Average	**61.1%**

trained 33 and 357, respectively.

Sixty-two utilities sponsored a total of 818 group-prospect meetings, reaching a total audience of 60,395.

Twelve of the large utilities ("A") tailor their own local promotions; one ties in directly with manufacturer-created promotions. Six adapt manufacturer promotions to suit their local needs, and 15 others combine all three approaches. The figures for the "B" companies are: 8—tailor own promotions; 2—tie-in with manufacturers; 8—adapt manufacturers' materials; 20—combine the three.

Fifty-five utilities offer free-trial demonstrations on commercial cooking equipment. Four of the 55 reported 100% sales results from the free trial; five obtained 95%; 14 utilities 90%; 10 utilities 80-85%; nine got 70-80% and 13 obtained results up to 70%.

Fifty-eight companies (29 from each division) report participation in dealer-manufacturer promotions. They accounted for 216 such joint promotions in the survey period, 143 of these were by "A"; 73 were by "B".

Various dealer incentive plans are used by the utilities. These range from prizes by New York State Electric & Gas to football and fishing parties at Northern States Power to $2 per kw at Central Power & Light Co.

Many of the utilities surveyed apparently realize the importance of the architect in getting electric CC equipment into buildings, especially new construction. To do this, 30 of the utilities in Division A made 3,063 semi-annual calls and 1,496 quarterly calls on the key architects to inform them about commercial cooking developments and advantages. Twenty-nine Division B utilities made 683 semi-annual calls and 298 quarterly ones.

Twenty-four of the utilities, 12 from each division, systematically follow-up leads obtained from Dodge Reports. "A" utilities (12) claim a total of 3,350 such follow-ups, and the "B" group, also 12, reports 1,585. A substantial number of these Dodge Report follow-ups were converted into sales.

Direct Mail Wins Favor

Direct mail is another favorite utility method for pushing commercial cooking. Mailing pieces are usually from three sources—the utility itself, a manufacturer, or another source, such as Electrical Information Publications. A study of the breakdown of which utilities use what kind of materials reveals no definite pattern. It must be said, however, that EIP material ranks high on their list.

Sixteen Division A utilities staged commercial cooking advertising campaigns in local newspapers, trade magazines, or both. Heaviest of all in magazine lineage was Los Angeles Department of Water and Power with 100 pages a year. Duke Power uses 24 pages of newspaper ads a year plus four in magazines. Detroit Edison takes 36 pages in magazines. Southern California Edison features 10 newspaper and 24 trade magazines ads a year. Nine Division B utilities also use ad campaigns.

As much as many utilities want to sell electric commercial cooking, they don't feel that the way to do it is by buying it—in the form of wiring subsidies. Only 10 use it as follows:

"A"—4 utilities—$5/kw
1 utility—$4/kw
"B"—1 utility—$6/kw
1 utility—$5/kw
2 utilities—$4/kw
1 utility—$1.50/kw

Layout service for commercial kitchens is another way utilities woo the customer. Twenty-one utilities in Division A use it, and report having laid out a total of 1,339 kitchens. Twenty-eight of the "B" utilities also do it; they report completing 725 during the 18-months survey period.

Model commercial kitchens on power company premises are another means of pushing the cooking load. Of these, Appalachian Electric has eight, Duke Power three, and Omaha Public Power District two.

Bell-ringing ranks high on the operational pro-

LOAD ANALYSIS
(Jan. 1, 1957 thru June 30, 1958)
(66 companies reporting)

New Construction 297,073 kw	58%
Remodelling, Replacement, New Applications 218,117 kw	42%

MARKET ANALYSIS
(Jan. 1, 1957 thru June 30, 1958)

Restaurants	— 243,562 kw	49% of market
Hotels	— 29,347 kw	6% of market
Schools	— 97,597 kw	19% of market
Hospitals	— 38,778 kw	8% of market
Industrial	— 37,541 kw	7% of market
Miscellaneous	— 55,497 kw	11% of market
	502,326 kw	100% of market

C.C. Promotions — How They are Used and How They Paid Off

Promotion	Results — Remarks
Free trial demonstrations of C.C. equipment	Fifty companies use it. From 1/1/57 to 6/30/58, they demonstrated 7,868 devices. Four companies obtained 100% sales results; 5 got 95%; 14 got 90%; 10 got 80-85%; 9 got 70-80%; 13 up to 70%.
Dealer-Manufacturer Promotions	Fifty-eight companies reported participating in a total of 216 of them from 1/1/57 — 6/30/58.
Dealer incentives	Nineteen companies have dealer-incentive plans. These range from fishing trips to bonuses per added kw. Most claim plans work well.
Calls on architects	Rates high with companies; 59 of them do it. From 1/1/57 to 6/30/58, they made 5,540 calls. Most feel this is an effective way to get electric commercial cooking in new construction.
Follow-up Dodge Reports	Twenty-four companies report systematic follow-up of Dodge Reports. Sales percentages resulting range from 10 to 90%.
Direct mail	Very high. Companies use utility, manufacturer and other mailing pieces. Used mostly as a "door-opener" for utility C.C. representative.
Advertising	Used by 25 companies. Mostly in local newspapers and trade journals. Results hard to measure.
Wiring subsidy	Only 10 companies use it. Average subsidy for these is $4.45 per kw.
Kitchen layouts	From 1/1/57 through 6/30/58, 49 companies completed a total of 2,064 kitchen layouts.
Model Commercial Kitchens	Eight companies report having such kitchens. One company has eight, another three, and one has two.
Door-to-door calls	Bell-ringing rates high on list. Almost all companies canvass food service prospects at least once a year, and several make calls semi-annually.
Follow-up calls on new customers	Sixty companies follow-up 100% of their new commercial cooking customers to check on their satisfaction after kitchen installation.
Satisfied customer cooperation	Fifty-seven companies report a total of more than 7,200 satisfied customers who have helped sell new prospects.
Food Service Magazine	Most companies (64) regularly mail Food Service Magazine to their commercial cooking prospects.
Sales drives	Twenty-eight companies run year-round campaigns. Sixteen run seasonal ones, mostly in the spring and fall; and 21 run seasonal campaigns for a three-months' period each year.

KW PER WEIGHTED CUSTOMER—1957

70 Companies—Top Ten		Division A—Top Ten		Division B—Top Ten	
1. Idaho Power	6.10	1. Pennsylvania P&L	4.54	1. Idaho Power	6.10
2. Merrimac Essex	5.02	2. Appalachian	4.16	2. Merrimac Essex	5.02
3. Pennsylvania P&L	4.54	3. Ohio Power	3.68	3. Knoxville Utilities	4.06
4. Appalachian Electric	4.16	4. Texas P&L	3.62	4. Toledo Edison	3.78
5. Knoxville Utilities	4.06	5. Gulf States	3.46	5. Utah P&L	3.66
6. Toledo Edison	3.78	6. Atlantic City	3.41	6. Northern Berkshire	3.63
7. Ohio Power	3.68	7. Carolina P&L	3.17	7. Washington W.P.	3.46
8. Utah P&L	3.66	8. Georgia Power	3.13	8. Minnesota P&L	3.43
9. Northern Berkshire	3.63	9. Ohio Edison	2.94	9. Suburban Electric	3.35
10. Texas P&L	3.62	10. Northern States	2.39	10. Worcester County	3.26
Average 70 companies	**2.14**	**Average 35 companies**	**2.01**	**Average 35 companies**	**2.37**

grams of reporting utilities. Asked to give the frequency of calls on food-service prospects, the utilities replied like this . . .

In Division A, eight companies make annual calls on 100% of their FS prospects, and two make semi-annual calls on 100%. The others do somewhat less than this, but in almost all cases these calls are made more frequently and on more prospects than might be expected. Only four utilities in Division A reported calling yearly on less than half their FS prospects. In Division B, the reported averages are even higher, which ties in with higher average number of man-years per 1,000 FS prospects reported earlier in this group. Fourteen utilities in this group call on 100% of their FS prospects, and none call on less than half of them.

To insure customer satisfaction, most utilities use follow-up calls on their new customers. In Division A, 27 utilities report 100% follow-up on new customers. In Division B, 33 utilities report 100%.

And this extra effort to insure satisfied customers pays off: they regularly prove to be top salesmen for commercial electric cooking. Many satisfied customers permit inspection of their all-electric kitchens by new prospects. The utilities in "A" report a total of 4,307 satisfied customers who have helped them. Likewise, "B" utilities report 2,929.

Most of the utilities regularly mail Food Service Magazine to their prospects. Food Service, an EIP publication, features all-electric advertising.

As with every other product or service that must be sold, commercial cooking must have sales drives. Twenty-eight companies (17 in "A" and 11 in "B") program year round campaigns. Sixteen utilities (four in "A" and 12 in "B") run seasonal campaigns, mostly in spring and fall, for six months of the year. Twenty-one (12 Division A and nine Division B) run a seasonal campaign for three months a year.

So much for the methods of promotion, now what about the results—the real payoff?

The 70 reporting utilities added 395,395 kw in 1957 and 197,421 kw during the first six months of 1958. The average '57 average per utility was 5,648 kw, up 6.5% over '56's 5302 kw. Total EAR for '57 was $9,217,151, for an average per utility of $117,388. For January-June of 1958, total EAR was $4,884,074, for an average per utility of $69,772. If the same growth rate is assumed for the balance of '58, average EAR per utility was $139,544, or up almost 19%. The average EAR per kw in 1957 and the first half of '58 are $23.31 and $24.73, respectively. This is an increase of 6.1%. The breakdown, by divisions:

Division A

	1957	Jan-June '58
Total added load	312,228 kw	156,063 kw
Av per utility	8,921 kw	4,459 kw
Total EAR	$7,241,833	$3,896,804
Av EAR/Utility	206,909	111,337
Av EAR/CC kw	23.19	24.96
Av kw/Customer	12.9	

Division B

	1957	Jan-June '58
Total added load	83,167 kw	41,358 kw
Av per utility	2,376 kw	1,182 kw
Total EAR	$1,975,318	$987,270
Av EAR/Utility	56,473	28,208
Av EAR/CC kw	23.75	23.87
Av kw/Customer	14.9	

Where does the load come from?

For 66 utilities reporting during the 18-months period, 58% came from new construction. This amounted to 297,073 kw. Forty-two percent came from remodelling, replacement, new applications, etc. These figures were exactly reversed in 1956.

Truck Provides Substation Test Facilities

S. C. **CLASS**, Maintenance Engineer, Substation Dept,

F. E. **RAGLIN**, Superintendent of Transportation, Public Service Co of Colorado, Denver, Colo.

A 10-ft panel truck serves as a complete substation test center for Public Service Co of Colorado. All on-site maintenance testing of electrical substation apparatus can be done from the truck.

Power is supplied by a 3500-w generator, installed in an insulated compartment to keep noise and heat transfer to a minimum. This generator, or an external source of power, feeds a switchboard where meters, safety circuits, and light controls are mounted. Various power feeds serve other truck locations.

Doble testing is the only procedure conducted from inside the truck. Because of the size and weight of Doble equipment, instruments are read on a test table provided with adequate lighting. The heavy equipment is bolted to the truck floor. A large reel for high voltage coaxial cable and automatic reels for other leads are also provided.

The rest of the space, less an aisle area, is devoted to storage of other test equipment. Apparatus to measure low resistances, such as circuit breaker contacts, dielectric strength of insulating liquids, ground resistances of substation grounding systems, and transformer voltage ratios is included. The mechanical behavoir of circuit breakers and insulation quality can also be measured.

Three passenger seats, equipped with safety belts, have been installed. One of the passenger seats can be moved to the test desk for use during testing. A file cabinet holds all test records, instruction manuals, and other literature needed.

Two rear windows provide rear view vision for the driver. Side windows aid verbal and visual communications during tests and enhance the ventilation afforded by the roof ventilator. Ladders and switch sticks are carried on the roof.

Four-Way Meter Monitors Differentials

J. E. **BEEHLER**, Senior Engineer, Relay Section, American Electric Power Service Corp, New York, N. Y.

Grouping of four monitoring instruments into a single mounting saves space and expense for American Electric Power Co. The Quadruplex Instrument thus formed consists of three ac ammeters and one 1-megohm resistance indicating meter which operate together to monitor current-type differential circuits.

Through observation of the four meters regularly for changes in reading, an indication of trouble may be noted. The three most common troubles are indicated thusly:

1. Short circuits in differential circuit connections—one or more of the meters drops to a lower reading.

(*Continued on page* 66)

Before you buy another tr

rtransformer...

EVALUATE INNOVATIONS

6% of General Electric's distribution-transformer sales goes to improve the product and reduce costs to you

Research in distribution transformers is a catalyst which speeds the normal rate of developments. To make innovations fast enough to keep pace with the unprecedented growth forecast for utilities, General Electric invests over three times as much, per sales dollar, as the average for all industry.

G.E.'s development of production line impulse testing, for example, increased average transformer life 15%. And development of grain-oriented core steel has saved over three hundred million dollars for electric utilities.

Other G-E innovations include: Strenicor clamps and bushings for copper or aluminum conductors. The return to you: a more durable and economical transformer to meet your system needs.

Before you buy another distribution transformer, evaluate innovations—give your transformer manufacturer credit for the extra values he gives you. G.E. Co., Schenectady, N. Y.

431-80

Progress Is Our Most Important Product

GENERAL ELECTRIC

GIVE YOUR TRANSFORMER MANUFACTURER CREDIT FOR THE EXTRA VALUES HE GIVES YOU

		G.E.	OTHER MFRS.			
MEASURE LOAD BUILDING—do Co.'s other products build load? Does Co. sponsor load-building programs?						
CHECK SERVICE—24-hour shipment? repair and uprating? emergency assistance?						
COMPARE FEATURES—how many exclusive features in terms of longer life; reliability; easy maintenance?						
ANALYZE PRICE—does Co. hold line against inflation with significant product developments?						
EVALUATE INNOVATIONS—has Co.'s research paid off for you? Recent examples?						

FILL IN THE BLANKS . . . See which manufacturer gives you more for your transformer dollar: Mark "X" for a measurable contribution, "O" for insignificant contribution.

Four-Way Meter

(*Continued from page* 63)

2. Insulation failure to ground in cables, terminal blocks, current transformers and their lead wires, or other associated equipment—the ohmmeter shows a reading of a value other than infinity.

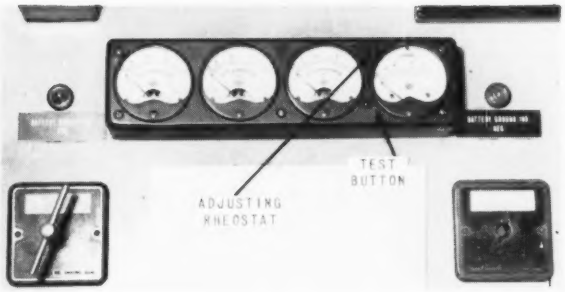
3. Accidental opens—usually one of the ammeters reads higher than the others.

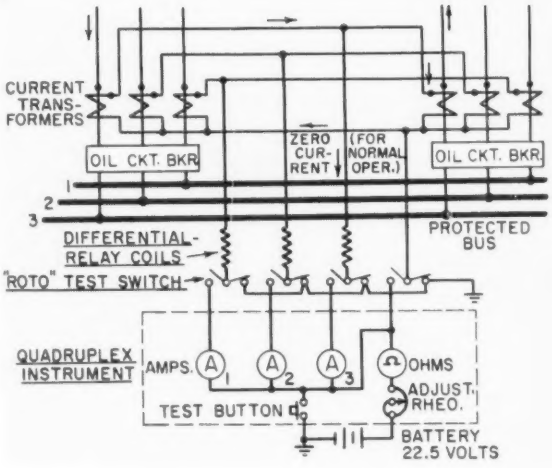
Ammeters have a range of 0-1 or 0-5 amp, depending upon the expected flow of unbalance current in the differential circuit where the meters are connected.

Normally, the meters are not connected into the differential circuit, except through a "roto" test switch with a removable test key. Only one key is available, and it is removable only with the switch in the normal position. Therefore, only one differential circuit can be tested at a time using the same meters.

Not all bus differentials use current unbalance detecting relays. Some of the more modern schemes replace the low-impedance current relay with a high-impedance voltage relay. Here the QI ammeters are replaced with voltmeters that measure the voltage across the differential voltage relay operating coils.

Caution should be used in employing this instrument with extremely sensitive differential relays such as those used on generator differential circuits. Because generator differential relays are usually set to trip on a 0.2-amp unbalance, switching must be arranged so there is no unbalance when the switch operates.





Modernize Shield Wire Design

BLIZZARD DAMAGE like this, which buckled goat heads and snapped ground wires, influenced ground wire designs

Philadelphia Electric Co is modernizing its transmission line overhead ground wire design in order to protect against severe blizzard conditions.

The following changes are planned:

1. Overhead ground wires will hereafter be sagged to a lower tension to provide a higher factor of safety.

2. Size of ground wires to be installed will be increased from 134.6 Mcm to 190.8 Mcm.

3. At trouble spots and river crossings, distribution transformers will be used to melt sleet from ground wires by placing 220 v across double ground wires short circuited at one end.

4. "Goat heads" will be strengthened somewhat, but not enough to prevent buckling before the breaking point of the ground wire is reached.

Ground wires were the source of most of the transmission outages on the Philadelphia Electric Co system during the March, 1958, blizzard.

Snow gathered faster on ground wires than on phase wires heated by load current. Ground wires accordingly sagged into phase wires, causing outages.

On some circuits 70% of ground wires were permanently damaged when aluminum strands stretched beyond the elastic limit, but steel core wires recovered —leaving aluminum strands loose or basketed.

ANOTHER GENERAL ELECTRIC

Kilovar Plus . . .

Cap-Gap Solves Distribution Voltage Problems

New General Electric Cap-Gap series capacitor and self-clearing protective gap allows economical loading of voltage-limited distribution transformers and supplies valuable peak-load kilovars

Here's what the new Cap-Gap does for you . . .

- Makes transformers virtually self regulating.
- Improves secondary voltage.
- Solves flicker problems caused by motor starts.
- Supplies peak-load kilovars.

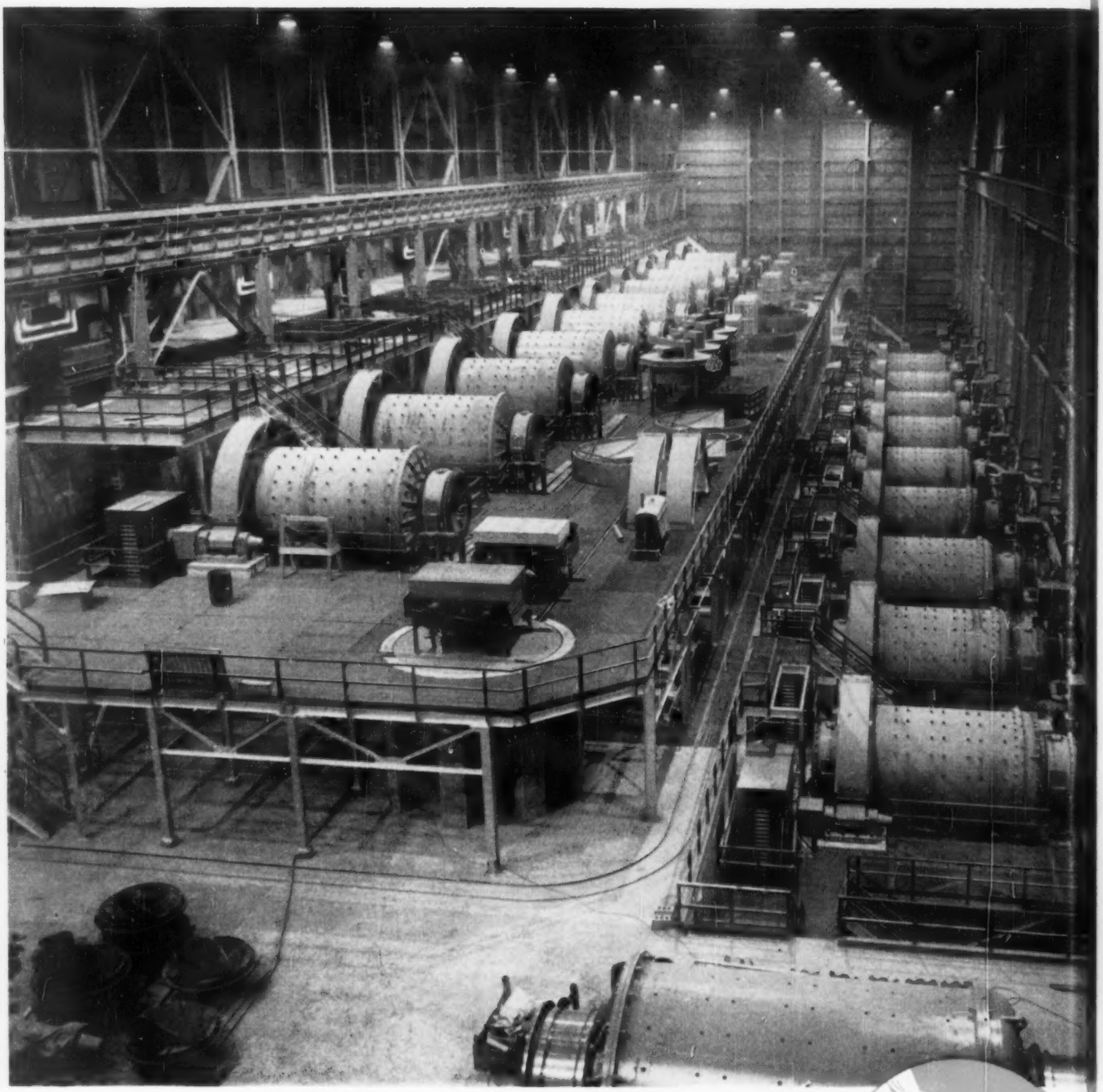
Here's how it works. The Cap-Gap actually cancels transformer reactance. When abnormal voltage conditions exist across the capacitor, a self-clearing gap protects the transformer, capacitor and system by automatically bypassing the capacitor once each half-cycle. It automatically reseals itself and reinserts the capacitor when normal voltage is restored. Cap-Gap units are rated 2, 3, 5, and 7½ Kvar, 240, 480 and 720 volts and can be used with 2400, 4800 and 7200 to 7960 volt distribution transformers 10 to 37.5 KVA.

No maintenance is required. There are no moving parts to wear out and both the capacitor and gap have stainless-steel cases and alumina-ceramic bushings. Cap-Gaps can be easily installed on either old or new distribution transformers.

See for yourself how the new G-E Cap-Gap can help you with your distribution voltage problems; contact your nearest General Electric Apparatus Sales representative, or write for Bulletin GEA-6855, General Electric Co., Schenectady 5, N. Y. 445-22

GENERAL ELECTRIC

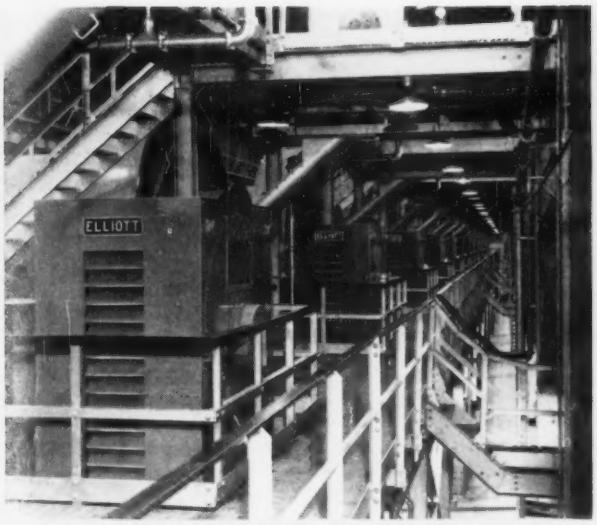
ELLIOTT machines serve



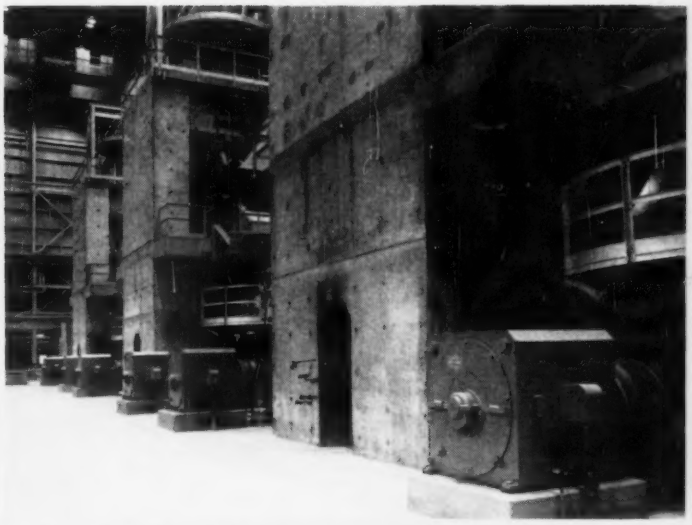
54 ELLIOTT SYNCHRONOUS MOTORS POWER ROD AND BALL MILLS

Above is shown a part of the world's largest ore mill installation, 27 rod mills and 27 ball mills, all powered by Elliott synchronous motors. Large chunks of taconite, one of the hardest minerals known, from the Minnesota Mesabi range are broken down in cone crushers and reduced to flour fineness in the above rod and ball mills. Magnetically separated from rock, the powdered iron is rolled and baked into walnut-sized pellets, and stored for shipment to steel's hungry blast furnaces. The above photo shows part of the quarter-mile-long concentrator building which houses the rod and ball mills. One of the 54 large Elliott synchronous motors can be seen in the foreground of each line of mills.

gigantic Taconite Operation

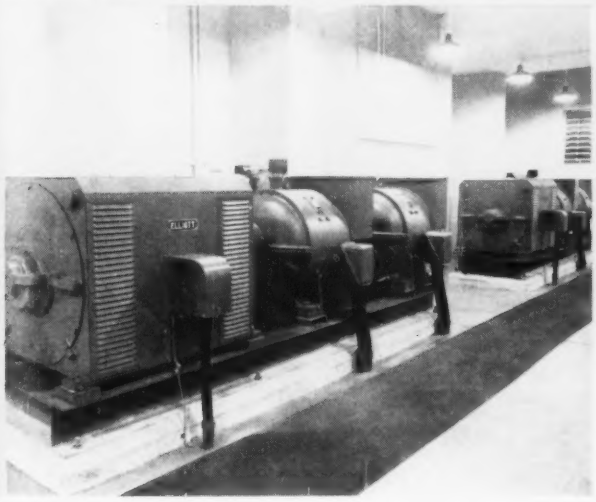


SOME OF THE SYNCHRONOUS MOTORS—The line of 27 Elliott 800-hp, 225-rpm motors which drive the rod mills seen on the left. 27 other Elliott 1250-hp, 225-rpm synchronous motors power the ball mills. Rigid fabricated steel construction and service-proved insulation provide reliable, non-stop power required in this 24-hour-a-day, 365-day-a-year operation.

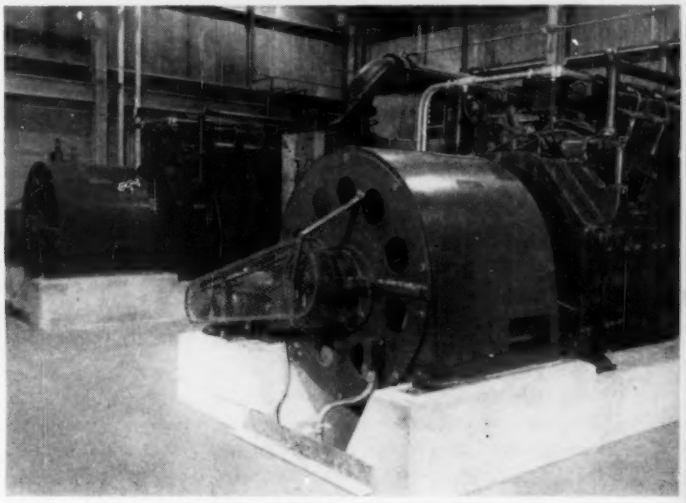


SQUIRREL-CAGE INDUCTION MOTORS—A few of the 18 Elliott 350-hp, 450-rpm squirrel-cage induction motors which drive cone crushers in the secondary crushing plant. FABRI-STEEL construction provides rugged mechanical strength and FABRI-SEAL insulation assures long, trouble-free service life — important features in this 'round the clock, continuous application.

3-UNIT MOTOR-GENERATOR SETS—Two of the 12 Elliott 300-kw, 3-unit m-g sets which provide direct current for driving magnetic separators, drums, crane operation and magnets, field excitation for the synchronous motors, furnace blowers as well as other services. Well balanced, coordinated design assures excellent mechanical and electrical capabilities.



DIESEL-DRIVEN GENERATORS—Two of three Elliott 1130-kw, 900-rpm generators with floor-mounted belted exciters driven by diesel engines—constantly available for emergency power generation. Enclosures are carefully designed to give the optimum in winding protection and insure adequate ventilation for maximum cooling of each diesel-driven machine.



ELLIOTT Company

RIDGWAY PLANT • Ridgway, Pennsylvania

R9-2

Ice Loading Nomogram for Wire or Cable

R. P. BUCKINGHAM, Wire and Cable Specialist, General Electric Co, Boston, Mass.

Ice load on an open wire or aerial cable can be determined by the accompanying nomogram. This graph is based on the following formula:

$$W_i = \left(\frac{D_i^2 - D_{wc}^2}{4} \right) \frac{\pi}{144} K_i$$

where

W_i = weight of ice per foot of cable, pounds
D_i = diameter over ice, inches
D_{wc} = diameter of wire or cable, inches
K_i = weight of ice per cubic foot, pounds

Weight of ice (K_i) is taken at 57.0 lb per cu ft

To Use the Nomogram

Place a straight-edge from the wire or cable "OD" scale (right) to the "Radial Thickness of Ice" scale (lower left), and at the intersection of the "Ice Load" scale (center), read the ice load (W_i) in pounds per foot of wire or cable.

Larger Radial Thickness of Ice

The "Radial Thickness of Ice" scale from zero to 0.8 in. should be satisfactory for most applications. If heavier ice loading is to be calculated, the nomogram may be used as follows:

A. Divide the total radial thickness into two or more increments which the nomogram will handle (e.g. 1.25 in. radial ice could be divided into one increment of 0.5 in. and one increment of 0.75 in. radial ice).

B. Using the nomogram, find weight of ice for smaller increment of radial ice (A above). This is slightly easier to read if the small increment is used first.

C. Add two times this radial ice thickness (B above) to the bare wire or cable diameter and, using the nomogram, find weight of ice corresponding to this OD and the radial thickness of ice remaining (the increment determined in A and not used in B).

D. Add B and C to get total W_i. (See example)

EXAMPLE. If a cable with OD = 3.26 in. will be subjected to ice loading equal to 1.25 in. radial ice, the weight of ice could be calculated using the nomogram as follows:

A. Divide 1.25 in. into two increments, 0.5 in. and 0.75 in.

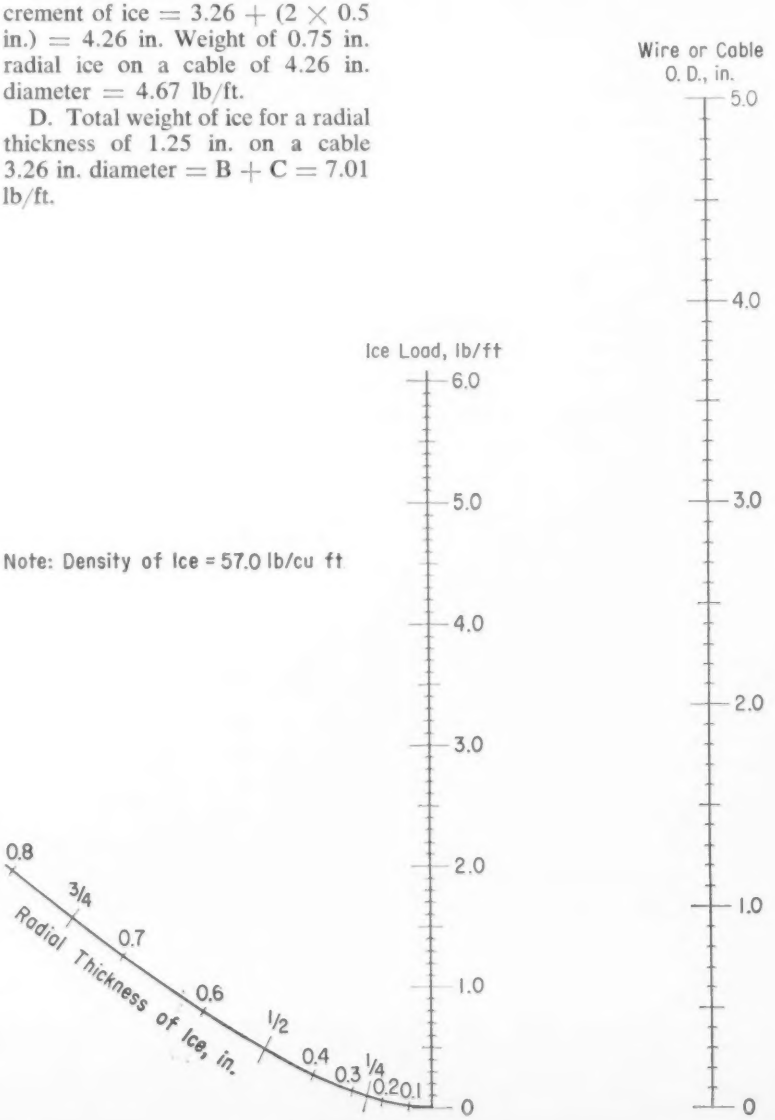
B. Weight of 0.5 in. radial ice on a cable of 3.26 in. diameter = 2.34 lb/ft.

C. Cable diameter for second increment of ice = 3.26 + (2 × 0.5 in.) = 4.26 in. Weight of 0.75 in. radial ice on a cable of 4.26 in. diameter = 4.67 lb/ft.

D. Total weight of ice for a radial thickness of 1.25 in. on a cable 3.26 in. diameter = B + C = 7.01 lb/ft.

Low Density Ice

In some areas, the weight of large deposits of hoarfrost or ice of lower density may have to be calculated. This can be done by first reading the weight from the nomogram and multiplying this answer by a ratio of the density of the desired ice to the density of the nomogram ice (57.0 lb per cu ft).



Long-Life features give Victor suspensions Life-Long performance

WILL LAST LONGER THAN YOU WILL

Men who purchase insulators are enthusiastic about the service records of Victor Suspensions. We're not surprised. Victor Suspensions are laboratory designed, manufactured under rigid quality controls and tested with the industry's most modern equipment. Don't forget, insulators have been manufactured at Victor since 1893 and insulator quality has been improving constantly ever since. To Victor, porcelain insulator-making is a science. Scientific methods together with meticulous attention to detail assure the finest insulators available. Put up a Victor Suspension today and chances are **you** won't ever replace it—it will last that long.

HOW TO CEMENT A REAL FRIENDSHIP

You just don't go out and buy a bag of ordinary cement for bonding insulator caps and pins to insulator bodies. No sir! The cement used in giving a 15,000 lb. Victor insulator double its rated strength, is a special type, premium grade cement carefully compounded specifically for use in insulator manufacturing. It costs more, but it is one big reason why a Victor Suspension with a rated mechanical and electrical strength of 15,000 lbs. can undergo pulls almost double its rating, before failure.

This is an important feature for any buyer of suspension insulators. It means that, when you install them on your lines, you have taken out a valuable insurance policy against the damage which can be wrought by high winds and ice.

Effect of all this careful attention to detail is not only a better insulator, but a mighty close and friendly relationship with our customers. There's nothing like a good product to cement real friendship between consumer and supplier.

VICTOR NO. 900
SUSPENSION INSULATOR

WE DRAW A BEAD ON BREAKAGE

No, we don't deliberately shoot at our insulators but we **do** safeguard our suspensions from breakage by special contours of the skirts. Take a good look at a Victor Suspension and you will notice that the edges of all corrugations (beads) are made extra thick in order to provide extra impact strength where such strength is most needed.

This feature of design together with the use of Purified Porcelain bodies provides an extra margin of accident insurance which any insulator buyer can appreciate.

OUR FACTORY IS FULL OF BABY SITTERS

Well, not actually in the common sense of the word. But we certainly do baby sit on every step of our manufacturing operations. Do you realize that in the manufacture of a "simple" Victor Suspension insulator there are almost fifty operations involved, practically every one of which comes under the Victor department of quality control. Such an intensive quality control program as this requires a lot of man-hours by a lot of people . . . constant study by our supervisors to keep abreast of the latest developments in this essential field. That means that Victor employs a lot of people who do nothing but watch manufacturing operations and maintain the high quality control standards which prevail in the Victor plant.

Result of such careful concern with quality: insulators that greatly exceed EEI-NEMA standards, have tremendous built-in margin of safety, that look better, perform better and last longer.

YOU GET TWICE THE INSULATOR YOU PAY FOR

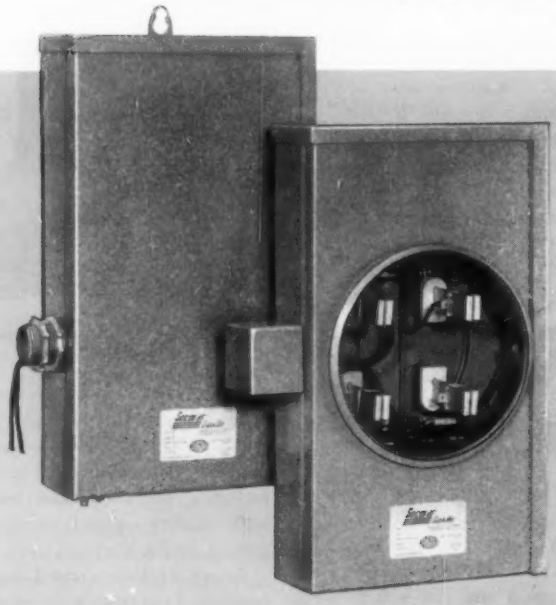
Victor Suspension insulators are designed and built to support tons of ice-coated, wind-swept conductor without failure. Caps and pins are on to stay—won't let go when they're needed most. Insulator bodies are made of Purified Porcelain . . . purest, hardest, strongest insulator porcelain ever made! Pull tests in the Victor laboratory show that Victor Suspensions withstand up to twice their EEI-NEMA ratings. That's why, when you buy Victor Suspensions, you buy practically twice the insulator you pay for . . . why Victor is the power man's best bargain! For details, write I-T-E Circuit Breaker Company, Victor Insulator Division, Victor, N. Y.

I-T-E CIRCUIT BREAKER COMPANY
VICTOR INSULATORS DIVISION

DEVELOPED TO MEET YOUR NEEDS:

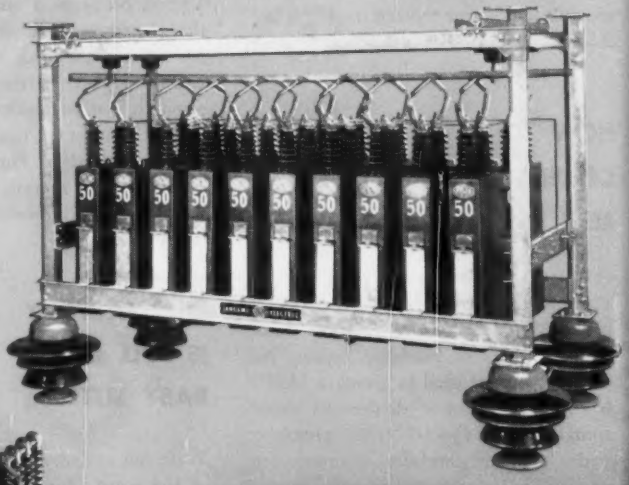
New capacitors,

TO INCREASE THE



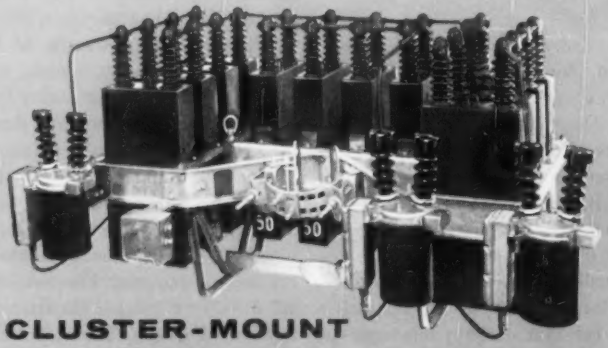
SECOVAR
Secondary Capacitors

These 240 volt capacitors are an exclusive Sangamo development. Installed at the customer's service, Secovars give maximum system benefits all down the line—and give the advantages of low first cost, quick and easy installation off the pole.



OPEN-TYPE Equipments

These cost-cutting single-phase or polyphase stacking units have been designed for combinations to give any desired kvar for all primary voltages.



CLUSTER-MOUNT
Autovar Equipments

Sangamo engineered, pre-wired cluster-mount equipments give you a fast, easy, economical capacitor installation and better weight distribution on the pole.

NEW CONTROL ADDITIONS TO THE MOST COMPLETE LINE IN THE INDUSTRY

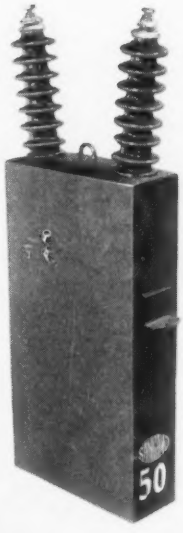
equipments, and controls

UTILITIES SALEABLE POWER

Keenly aware of your problems of reducing the amount of wattless power and improving voltage on your system, Sangamo's developments this past year make its line of capacitors and controls the most extensive in the industry . . . your first source of supply for all capacitor needs.

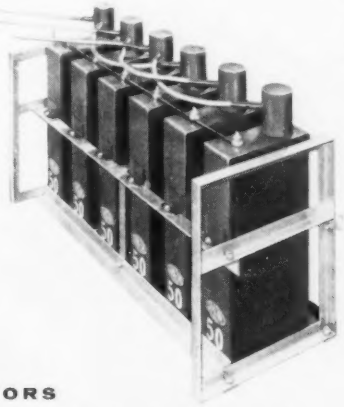
HOUSED CAPACITOR EQUIPMENTS

Combining safety and neat appearance, these housed equipments provide a compact installation with features including automatic control and circuit breakers.



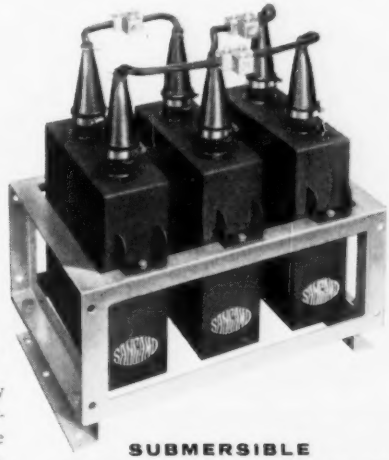
15 KV CAPACITORS

These capacitors were developed for floating Y applications and are capable of resisting voltage surges up to 95 kv.



SUBMERSIBLE PRIMARY EQUIPMENTS

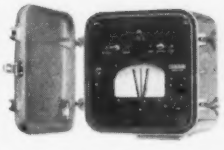
Sangamo designed these completely sealed primary equipments for underground installation in locations where overhead pole space is not available.



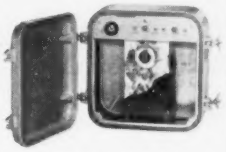
SUBMERSIBLE SECONDARY EQUIPMENTS

Developed for low voltage underground network installations, these factory-assembled equipments are completely submersible.

Socket type voltage Lincolntrol

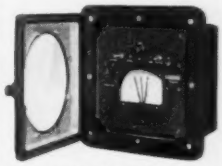


Voltage Lincolntrol with thermostat bias



Carryover socket type time switch

Carryover type time switch



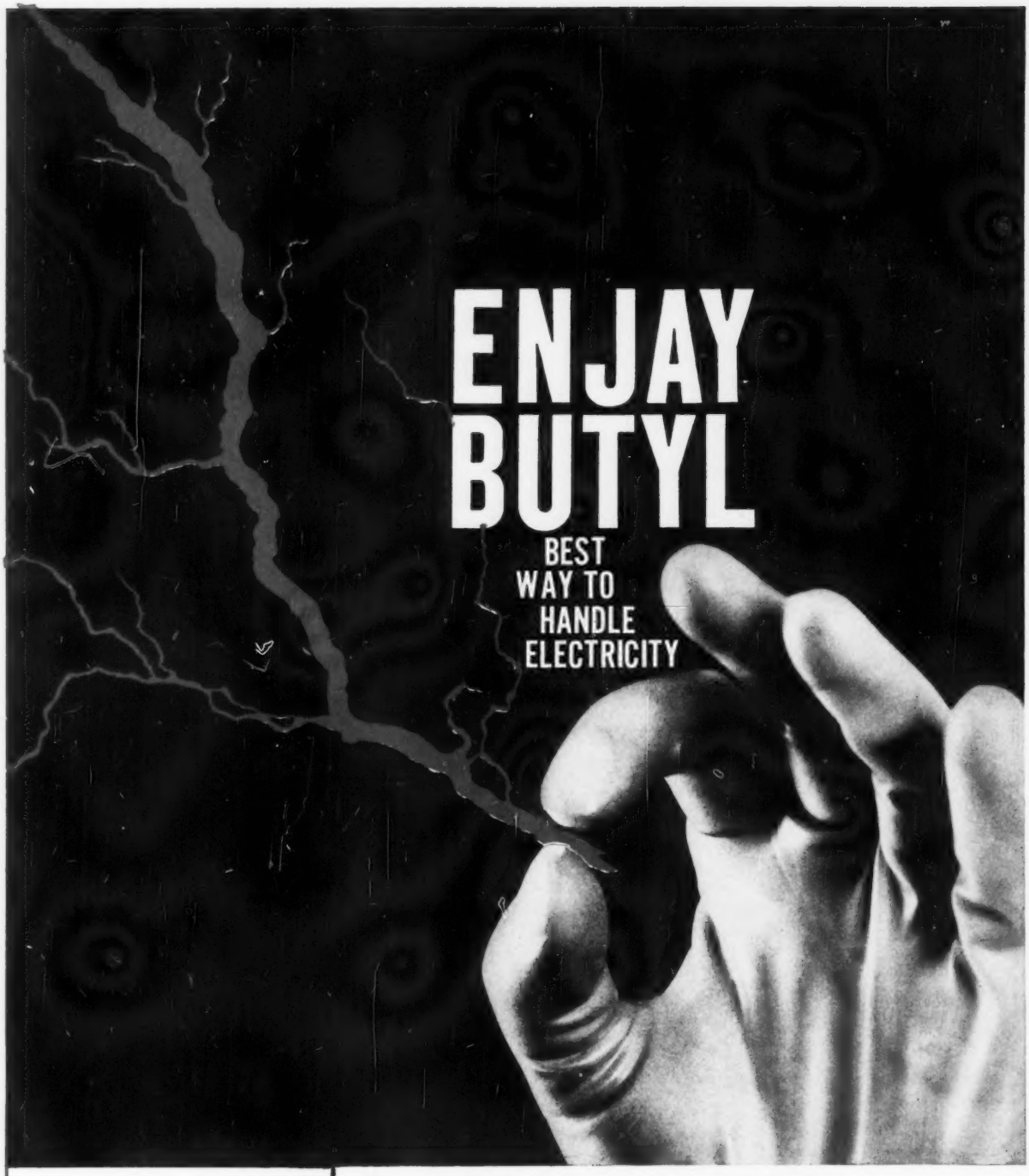
Switchboard type Lincolntrol

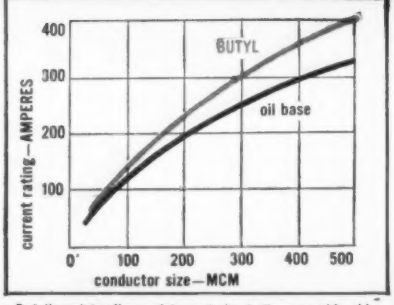
To keep pace with your switching applications, Sangamo's new control developments, in addition to the above, are units for temperature control, current bias voltage control and sequence switching.

PC59-1

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS





Butyl's outstanding resistance to heat allows considerably higher currents for any given conductor size.

Of all vulcanizable rubbers, Enjay Butyl offers the best electrical and dielectric properties. Butyl is the ideal material for wire and power cable, transformers, tapes, busbars and other insulation applications.

Butyl *also* offers outstanding resistance to weathering and sunlight . . . chemicals . . . abrasion, tear and flexing . . . superior damping properties . . . unmatched impermeability to gases and moisture.

Find out how this versatile rubber can improve your product. Call or write the Enjay Company, today!

ENJAY® BUTYL

ENJAY *Pioneer in Petrochemicals*

ENJAY COMPANY, INC., 15 West 51st Street, New York 19, N. Y.

Akron • Boston • Charlotte • Chicago • Detroit • Los Angeles • New Orleans • Tulsa

Eye-Fi Relighting Gets Industry Support

Six electrical industry organizations and three lamp manufacturers have banded together to support a new lighting promotion, Eye-Fi Relighting, (EW, Sept. 11, 1958, p 91). The program was developed by the National Lighting Bureau, which has been reorganized as an all-industry operation.

Industry sponsors are: Edison Electric Institute, National Electrical Manufacturers Assn, Certified Ballast Manufacturers Assn, International Assn of Electrical Leagues, National Assn of Electrical Distributors, and National Electrical Contractors Assn. The manufacturers are: Lamp Division, Sylvania Lighting Products Inc; Large Lamp Dept, General Electric Co; and Lamp Division, Westinghouse Electric Corp.

Constant improvements in lighting techniques "tend to render existing business places obsolete," said L. C. Messick, NLB manager. "Eye-Fi Relighting can inexpensively and effectively save many existing buildings from such obsolescence."

A campaign to dramatize the fact that inadequate lighting means lower sales in stores, lower efficiency of production in plants and offices, and lower levels of learning in schools, will start next month.

Ads will run in general news and trade publications. A booklet stressing the benefits of relighting will be merchandised through advertising, and distributed by utilities, electrical contractors, and other local groups. Manufacturers will tie in by attaching Eye-Fi tags to their fixtures and through advertising.

Business District Has 12.6 Ft-C Lighting

A street lighting system with an initial ft-c level of 12.6 and a maintained level of 7.6 has been installed in Upper Darby, Pa., a suburb of Philadelphia. It is reportedly the second brightest street in the country, surpassed only by Chicago's State Street, (EW, Sept. 8, 1958, p 83; Dec. 15, 1958, p 72), and the first major retail business street to employ 1,000-w clear mercury lamps for street lighting.

In the photo, the new is illustrated by the six lights in the foreground, while the old is shown in the background. The old had a 0.5 ft-c level. The whole street is now lighted with the lights shown in the front and merchants hail it as "a rejuvenation of the entire area."

Sixty-six General Electric Form 402 units have been installed. The luminaires are mounted on 8-ft bracket arms and are spaced oppositely at 90-ft intervals, 32 ft above the pavement.

Philadelphia Electric Co installed, owns, operates, and maintains the street lighting system, charging the township published tariff rates.

Water District to Install Street Lighting System

King County (Wash.) Water District No. 61 is going to install a $30,000, 400-light, residential street lighting system. The Seattle-located water district had built up a maintenance fund of $25,000 in government savings bonds to meet current needs, and this fund will now be used for the street lighting.

Shaded incandescent lights will be provided free by Seattle City Light, and installed by the utility at an expected cost of $75 each. The district will pay the utility $1 per light per month for maintenance.

Commissioner Herb Miller said, "We believe that lights are almost as important as water in a new district. The new lights will benefit the entire district by raising property values, reducing traffic accidents, and discouraging crime."

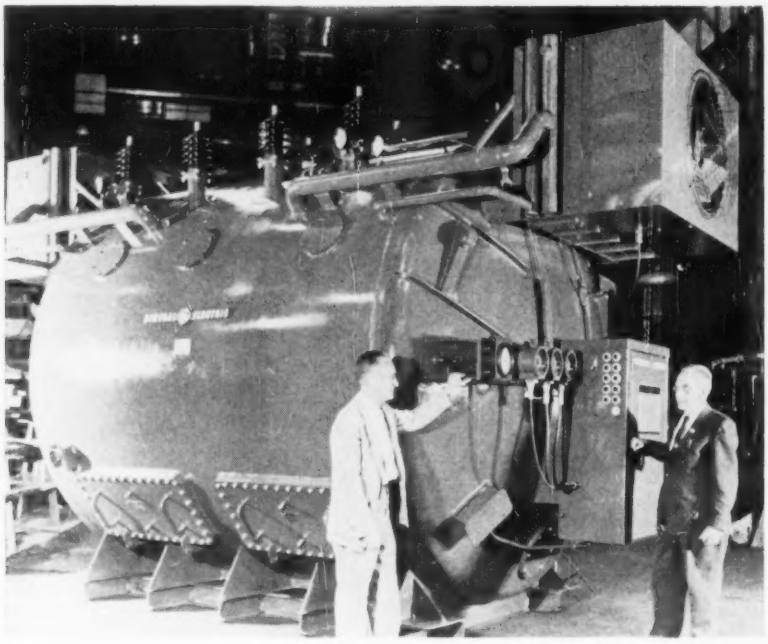
Two other King County water districts had previously installed lighting systems but on a smaller scale.

Expositions Scheduled for Philadelphia & Washington

Two meetings of interest to utility men will be held early this year.

The 14th International Heating & Air-Conditioning Exposition will take place Jan. 26 to 29 at Convention Hall, Philadelphia. Approximately 450 displays will feature equipment for heating, ventilating, cooling, and complete air conditioning.

Feb. 17 to 19 are the dates for the Second Biennial Electrical Trade Conference and Exposition in Washington, D. C. The Electrical Institute of Washington and Electrical Manufacturers Representatives Assn of Baltimore are co-sponsors.



GE Ships 10 Mva Gas-Filled Transformer

A gas-insulated power transformer rated 10,000 kva, 69-12.4 kv has been shipped from General Electric Co's Pittsfield, Mass., plant to the Pennsylvania Power & Light Co. This unit is the highest capacity of its design built to date, and will be installed in an outdoor substation at Allentown, Pa.

Insulating medium and primary coolant is sulfur hexafluoride (SF_6), a heavy, nontoxic, nonflammable gas circulated through the transformer's core and coils by blowers. A feature of the new unit is that blower motors can be inspected without removing gas from the tank.

Greater safety, less weight, and quieter operation are the main advantages of gas insulation, according to GE engineers. Inspection is made by GE engineers H. C. Stanley, left, and G. Camilli, see photo. The transformer weighs 47,900 lb, compared to 66,500 lb for an oil-filled unit of similar rating. Sound level is several decibels lower.

First gas-filled power transformer built by GE two years ago is rated 2,000 kva at 69 kv. Two identical units are now in service on Consolidated Edison Co's system.

Two other gas-filled transformers slightly less than 10,000 kva capacity are under construction by GE. The company recently received an order for two transformers rated 12,500 kva, 115 kv. These are the first orders for gas-insulated transformers at voltages above 69 kv.

Anaconda Opens Wire Plant in Georgia

Anaconda Wire and Cable Co's new plant at Watkinsville, Ga., is expected to be in full operation in March, say company officials. The equipment installation is about complete and pilot operations are under way. David T. Warner is manager, moved from Charlotte, N. C.

The plant covers approximately 150,000 sq ft, and is located on a site of 175 acres in Watkinsville, about seven miles from Athens. When completed, it will manufacture and carry additional stock to provide a complete line of Anaconda wires and cables and cable accessories, including telephone wire.

I-T-E Doubles Scope of Power Network Analyzer

Addition of a new unit to the network analyzer system of the I-T-E Circuit Breaker Co, Philadelphia, has doubled equipment size and capabilities. The new analyzer, valued at $300,000, is reportedly one of the largest in the world. Services of the computer-like analyzer are rented on a daily fee basis for the study of all types of power system problems.

It incorporates 24 generators, 406 circuit elements, and 300 buses. Design advances include: (1) Control simplicity and flexibility; (2) High-impedance base; (3) Five degree phase-shift; (4) Automatic-adjusting load units.

The analyzer can handle all types of power system problems, including studies of load flow, short circuit effects, and transient or steady-state stability. It has an impedance base of 4000 ohms and a current base of 25 milliamperes, resulting in a voltage base of 100 volts. This low-current base affords compact design without any component overheating and, at the same time, permits greater per-unit current ratings.

Porcelain's H-V Division Merged with Chance Co.

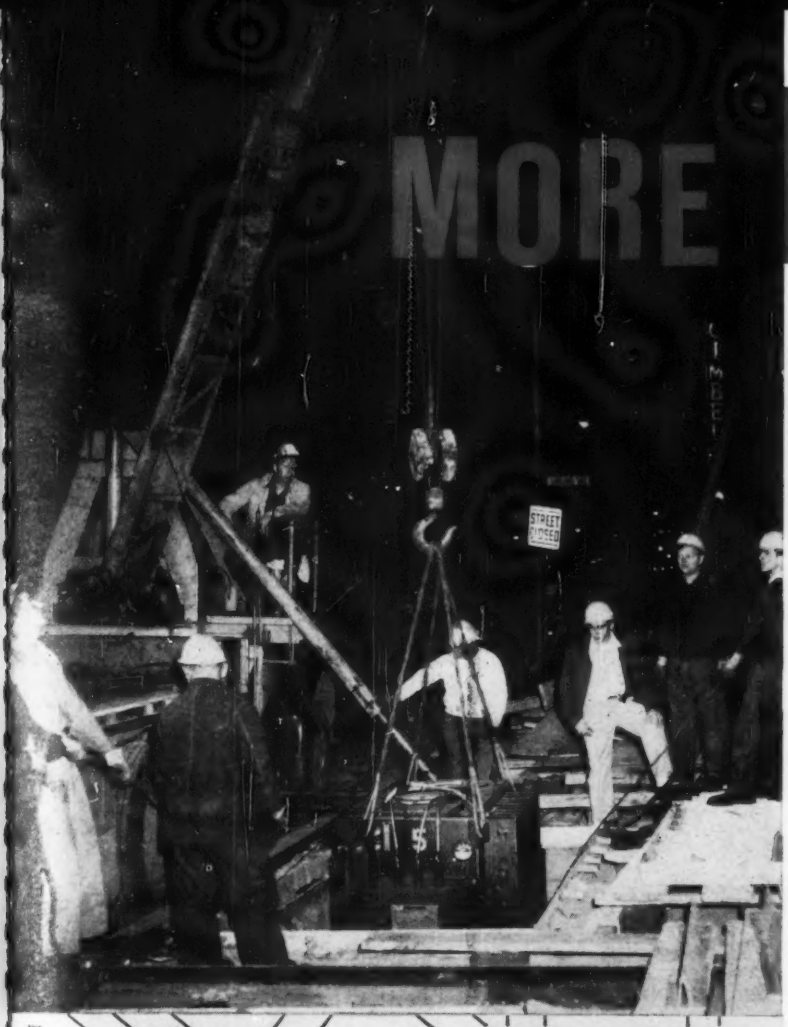
A. B. Chance Co, Centralia, Mo., absorbed the high-voltage division of Porcelain Products, Inc, a subsidiary at Parkersburg, W. Va., effective Jan. 1, 1959. George Ruoff, formerly president of the subsidiary, has been made a vice president of Chance Co. Harold Elliott, former Porcelain Products Sales Manager, will be Product Manager, Insulators, and will be transfered to the Centralia headquarters.

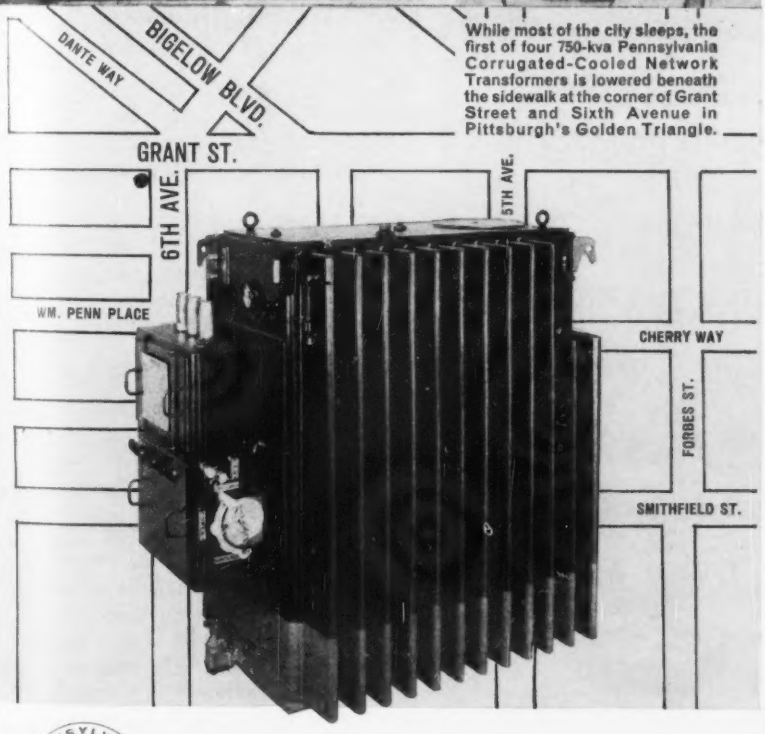
Porcelain Products standard high-voltage insulators will be marketed as "Chance insulators." The low-voltage division at Carey, Ohio, will continue to operate as a division of Chance Co with a separate marketing organization.

(More Manufacturers News, p. 78)

MORE POWER

goes underground for Pittsburgh's renaissance





While most of the city sleeps, the first of four 750-kva Pennsylvania Corrugated-Cooled Network Transformers is lowered beneath the sidewalk at the corner of Grant Street and Sixth Avenue in Pittsburgh's Golden Triangle.

Golden Triangle Gets New Pennsylvania Network Transformers with Corrugated Cooling

An important part of Pittsburgh's much acclaimed "renaissance" is going underground, as Duquesne Light Company installs additional power distribution equipment to meet the challenge of increasing loads in the Golden Triangle.

Beneath the sidewalk at Grant Street and Sixth Avenue, four 750-kva Pennsylvania Network Transformers have been installed to serve the lighting and power needs of one of Pittsburgh's newest skyscrapers. In keeping with other aspects of the renaissance, these transformers were designed and built with the *future* in mind. All are provided with Corrugated Cooling —the modern network transformer tank design that greatly simplifies maintenance and helps eliminate corrosion.

There are no ledges or crevices on which the corrosive materials that are characteristic of most sidewalk vault installations might collect. The smooth, straight walls of the corrugations are easy to clean and easy to paint—even from above the transformer. Coupled with the use of low-alloy, high-strength, corrosion-resistant steel, such ease of maintenance provides highly effective protection against corrosion.

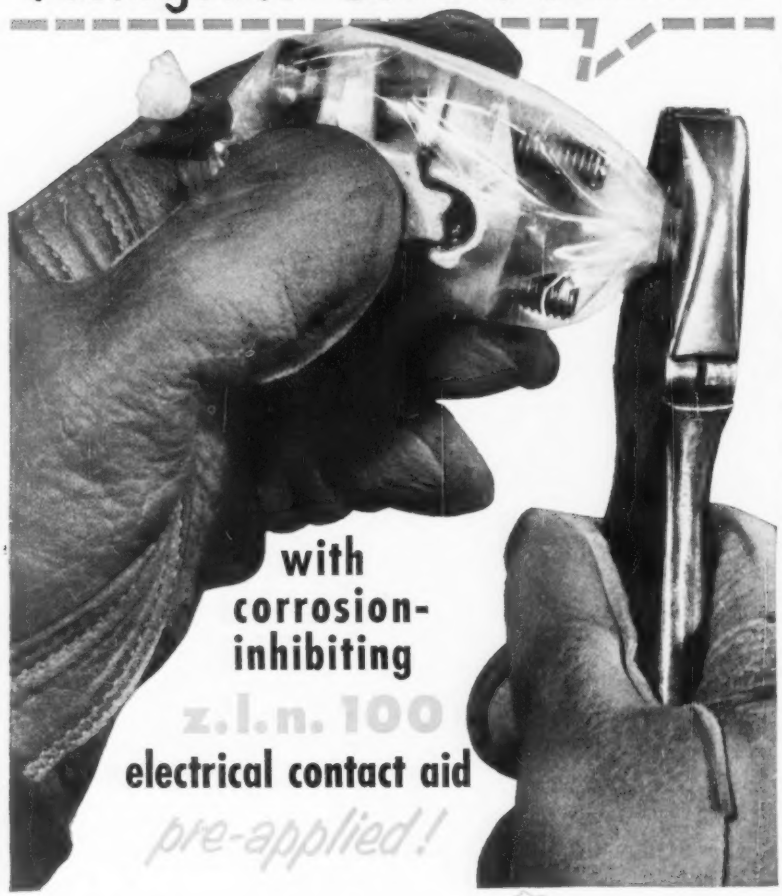
Whether your own network transformer needs stem from a community renaissance or routine replacements, it will pay you to investigate the advantages of Pennsylvania Corrugated-Cooled Network Transformers. Contact Pennsylvania Transformer Division, McGraw-Edison Company, Canonsburg, Pa.

McGRAW EDISON

PENNSYLVANIA TRANSFORMERS

PENNSYLVANIA NETWORK TRANSFORMERS

Packaged for Circuit Protection!



All Chance Uniclamps -Parallel Groove Clamps -U-Bolt Connectors -and Hot Tap Clamps are now available in individual plastic packages with z.l.n.100 pre-applied! Clamp stays clean . . . sealing tape reminds lineman to wire-brush and apply z.l.n.100 to the conductor too!

A·B·CHANCE COMPANY

GENERAL OFFICES: CENTRALIA, MISSOURI
(A·B·CHANCE CO. of Canada, Ltd., Toronto)

CC58-9

New NEMA Section Issues First Standard

An Overhead Distribution Connector Group has been organized within the Switchgear Section of the National Electrical Manufacturers Association, advises H. F. Hentschel, Section Chairman. Hentschel is general manager, Medium Voltage Switchgear Department, of General Electric Co.

The new group is composed of eleven companies and is chairmanned by K. R. Way, vice president, Jasper Blackburn Corp. In operation only a few months, the group has moved rapidly to pose solutions to technical utility industry problems by developing standards for unplated, split-bolt and vise-type connectors for copper conductors.

Copies of the publication, identified as "Electrical Connectors for Copper Conductors, Unplated, Split-bolt and Vise-type," Publication No. SG 14-1958, can be obtained for 20¢ each from National Electrical Manufacturers Assoc, 155 E 44 St, New York 17, N. Y.

Du Pont's Fiber Material Blocks Heat Penetration

E. I. du Pont de Nemours, Wilmington, Del., has developed a fibrous potassium titanate, composed of a compact mass of crystalline fibers.

Due to the small diameter (less than 1/25,000 of an inch) and high reflectance of the fibers, the new insulating material blocks heat penetration by scattering incoming infrared rays.

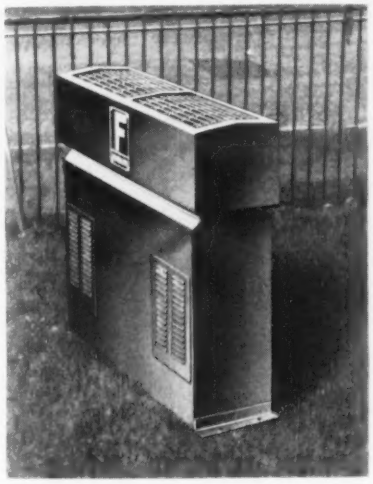
Suggested applications include use for electrical and acoustical insulation, reflective shielding for heating units and ovens, gaskets and packing, filters, fire blankets, and protective clothing.

One of the advantages of the product is ease of fabrication. Presently available forms include loose fibers, blocks of varying densities, and trowelable material which can be spread on almost any irregular surface when combined with water. It is now produced on a semi-works scale at Du Pont's Newport, Del., plant.

Square D Makes Organizational Changes

Square D Co has set up a Manufacturing Division in Cedar Rapids, Iowa, with Vice President James Vaughan in charge. This shift in the operation away from Detroit will not result in a reduction of hourly employment there or in any move of the company's executive offices away from the city.

Another move toward divisionalization is Square D's shifting of its distribution and equipment operations from the Detroit plant to Lexington, Ky. There they will be carried on under the supervision of Grant McDonald who will be in charge of a new Distribution & Equipment Division.



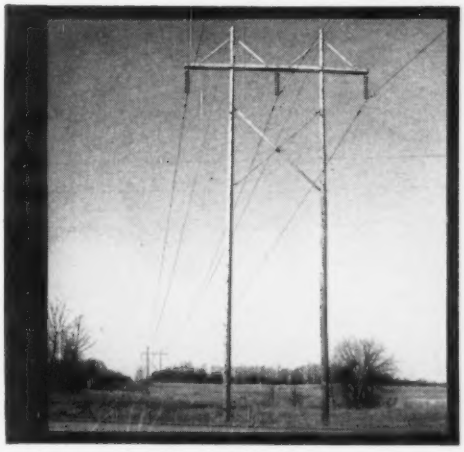
Underground Transformer Developed by Ferranti

A buried distribution transformer, developed by Ferranti Ltd, Manchester, England, is on the line for the South of Scotland Electricity Board. Shown in picture is the ventilating pillar, protected against blockage. Underground and to one side of the pillar, is a tank which contains the 500-kva, 11,000/433-v, 3-phase, air-cooled transformer, utilizing Class C non-hygroscopic and non-flammable materials.

Being offset to the tank, the pillar can be safetly replaced or repaired without disconnecting the transformer. It separates the incoming from the outgoing air. Installation

(*Continued on page* 83)

GALVANIZED STEEL STRAND

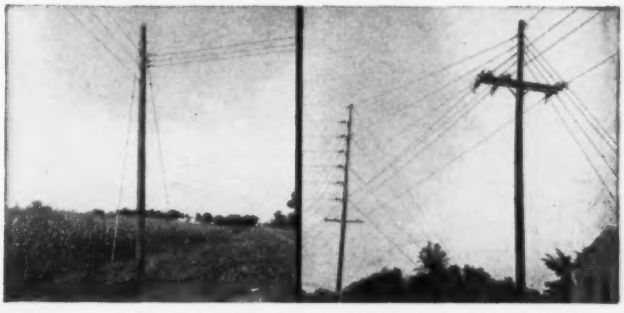


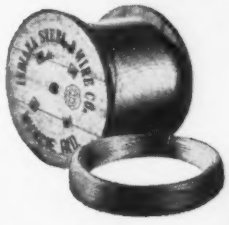
YOUR ASSURANCE OF HIGH QUALITY, LONG LIFE AND LOW COST

Close laboratory control over each step in manufacture has established Crapo Galvanized Steel Strand as a product of highest quality and dependability. You benefit through longer service life and lower ultimate costs.

Heavy, uniform, tightly-bonded coatings of commercially pure zinc, applied by the famous Crapo methods, withstand the punishment of construction, provide maximum resistance to corrosion and contribute to over-all economies.

For OVERHEAD GROUND WIRE . . .
CRAPO Weldless Galvanized Steel Strand





The most practical and economical strand for shielding transmission lines against lightning. Maximum strength and high fatigue endurance, inherent in Crapo Weldless Strand, provide that extra safety factor so important in overhead ground or static wire.

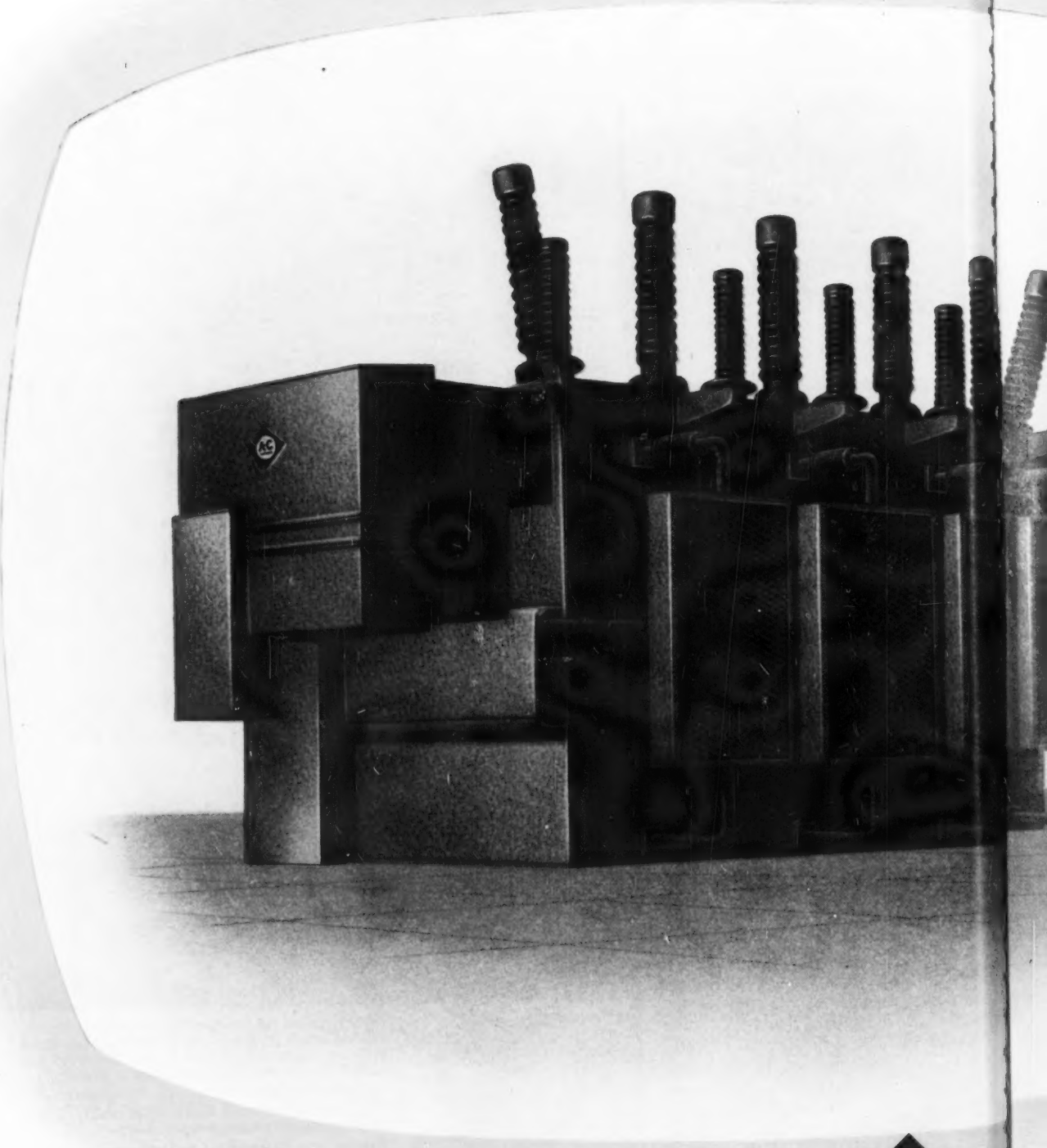
For GUYS and MESSENGER . . .

Crapo Galvanized Steel Strand. Made to highest standard specifications . . . a size and breaking strength to meet all practical needs.

Contact your jobber or write for descriptive folder.

INDIANA STEEL & WIRE CO., INC.
Muncie, Indiana

Another example of



A-5885

Allis-Chalmers leadership in transformers

404,250-kva Transformer for Crawford Station

A LARGE three-phase transformer — perhaps the largest — was recently ordered by Commonwealth Edison Company for delivery to Crawford Station in 1960.

The transformer is designed to fit the limited space available between two buildings at Crawford Station. It will also be sized to permit shipment as a complete unit with only bushings and *Electro-Coolers* removed for shipping.

This transformer will weigh about 660,000 pounds and have an equivalent two-winding capacity of 404,250 kva.

Rating of the low voltage winding is 385,000 kva at 12,600 volts. Its two high voltage windings are each rated 211,750 kva and will feed two 138-kva systems. Plus or minus 10 percent load tap changers will be provided for each high voltage winding.

The trend to modernization of power stations is being accelerated by the economies of these larger transformers, as well as bigger generating units.

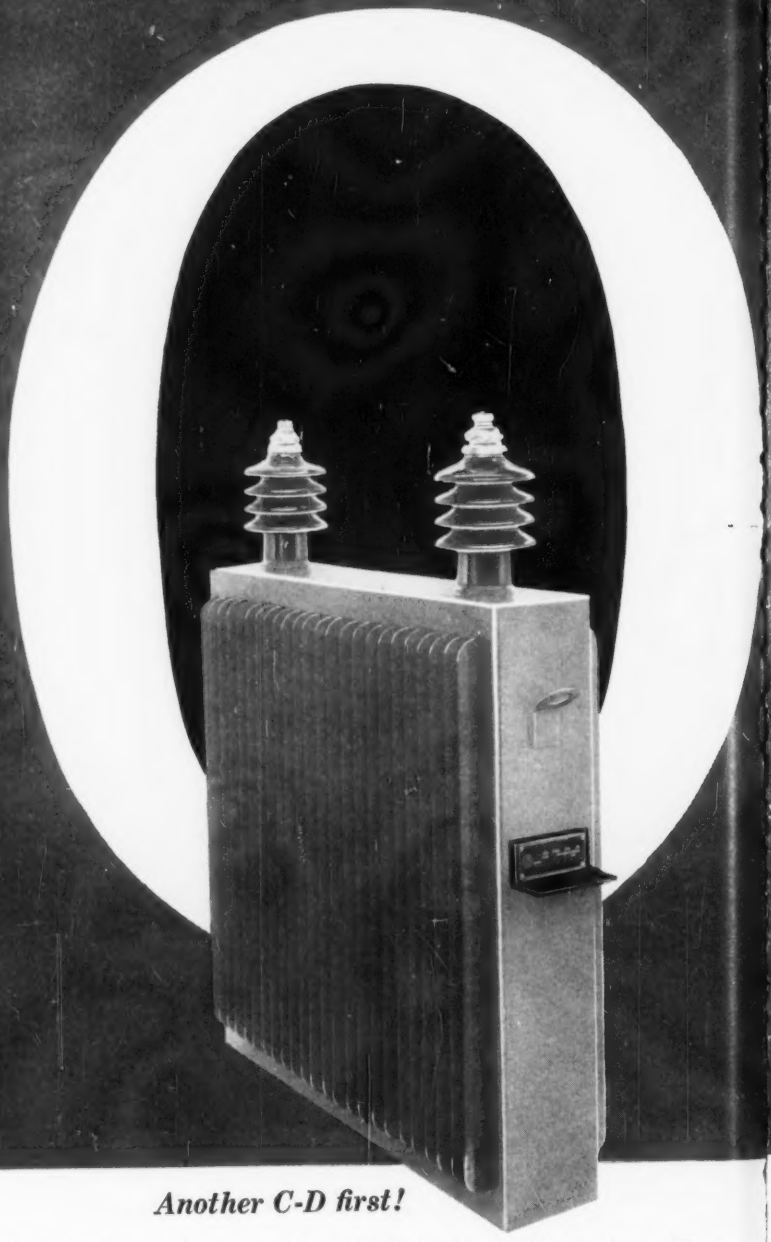
For further information about the design, building and testing of Allis-Chalmers power transformers, call your nearby A-C office, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

Electro-Coolers is an Allis-Chalmers trademark.

ALLIS-CHALMERS

A MAJOR ACHIEVEMENT IN POWER FA

the C-D 100



Another C-D first!

Utility engineers welcomed Cornell-Dubilier's introduction of the first individual capacitor unit rated to deliver a full 100 Kvar. It is available in standard voltage ratings of 4800, 6640, 7200, 7620 and 7960 volts.

Because it reduces by one-half the number of (50 Kvar) capacitors required for substation racks and pole-mounted banks, these 100 Kvar units occupy less space and cut installation and maintenance costs.

All of the advanced features exclusive with C-D power-factor capacitors — including the lowest volts per mil (333 v.) and power losses considerably below the NEMA limit of 3⅓ watts per Kvar are incorporated. Every unit is factory-energized for hours at full-rated voltage as a final quality check

Insure low-maintenance service from your next power-factor installation, by talking it over first with a C-D engineer. Just write to Cornell-Dubilier Electric Corporation, South Plainfield, N. J. Dept. D-19.

CORNELL-DUBILIER CAPACITORS

CORNELL-D

FACTOR CORRECTION...

The power factor
capacitors that
give you better than
99.6% trouble free
DUBILIER service!

Underground Transformer

(*Continued from page 79*)

can be made in a wall or hedge.

Costs of Class C insulated transformers are reported to compare favorably with expense involved in installing a standard conventional transformer in an outdoor substation. Class C materials are non-hygroscopic and non-flammable.

This type of transformer can be installed at a load center without difficulty, according to Ferranti, in direct contrast to the more conventional method of reinforcing networks by replacing transformers with units of higher rating. The manufacturer advises that field tests for the past year showed that the unit can withstand the most severe distribution loading conditions.

MANUFACTURERS BRIEFS

Marcus Transformer Co, Rahway, N. J., manufacturer of dry and liquid-filled transformers, announced a public offering of 75,000 shares of common stock at $4 per share. Previous expansion has been financed by the company's earnings; however, increased rate of growth indicates a need for expansion which cannot be met by private capital.

Delta-Star Electric Div, H. K. Porter Company, Inc, has opened a district office in Seattle, Wash. R. E. Willis is district manager.

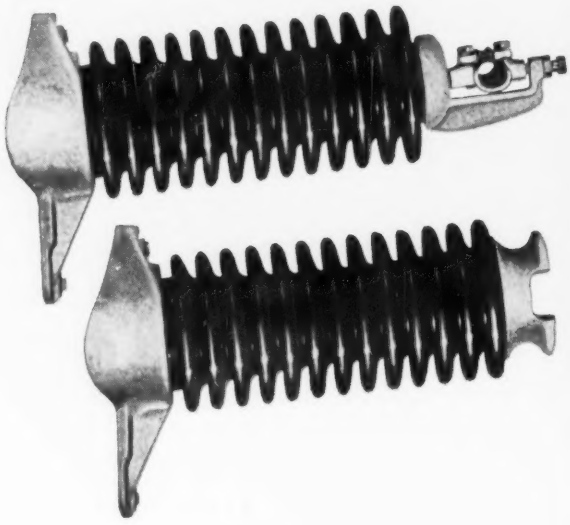
Ross Heat Exchanger Div, American-Standard, has established a Kansas City District office at 5920 Nall Ave, Mission, Kan., under the management of Don Rumsey.

C. H. Wheeler Mfg Co is offering a re-edited, 38-page Condenser Handbook which provides simple methods of calculating steam condenser performance and charts and tables of basic information. Copies are available without charge to persons writing on company letterheads; otherwise, there is a charge of $2.00. It is requested by Wheeler that anyone who has a first edition should return it for exchange. C. H. Wheeler Mfg Co, 19th and Lehigh Ave, Philadelphia 32, Pa.

New Equipment

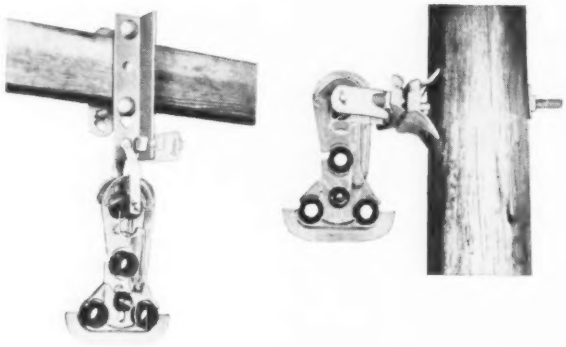
(For further information refer to Reader Service on page 88)

Post Insulators . . .



. . . for horizontal mounting are attached directly to the side of wood poles. A pole gain, curved to fit the side of the pole, is incorporated into the base of the insulator. The insulators, rated at 35, 45, 55, 66 and 88 kv, are available with either clamp-top or tie wire heads. Clamps in malleable iron or aluminum for the clamp-top posts are interchangeable on all units and are available for 0.25 to 1.50-in. conductor sizes. The insulator is attached to the pole by two through bolts and cannot drop below horizontal.

Lapp Insulator Co, Inc, Le Roy, N. Y.



Aerial Cable Hardware . . .

. . . is designed for use with spaced aerial cable clamps. Five basic designs offer a complete range of application and include a corner bracket and suspension assemblies for crossarms, close or extended tangents, and pole-tops. The high-strength components attach directly to the pole or crossarm. Surfaces of all parts are galvanized to insure long service life.

Line Material Industries, McGraw-Edison Co, Milwaukee 1, Wis.

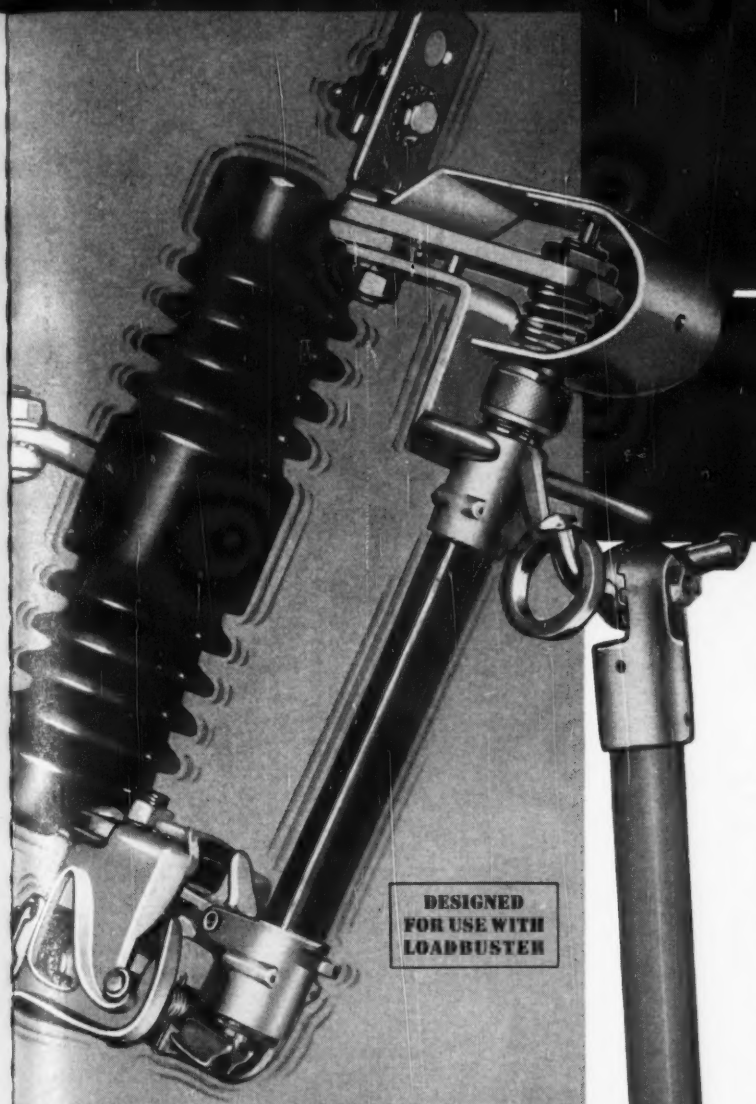
Wheel Ditcher . . .

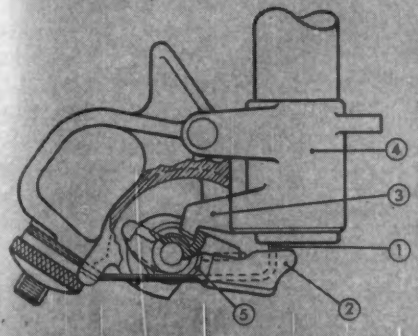
. . . digs a maximum of 5 ft 6 in. deep and offers a complete range of digging widths from 14 to 24 in. An all-hydraulic transmission eliminates gear shifting and provides an infinite range of crowding speeds from 0 to 28 ft per min. A flexible drawbar lessens strain and twisting during digging. The Model 772 ditcher offers belt speeds up to 630 ft per min.

Barber-Greene Co, 400 N Highland Ave, Aurora, Ill.

(*More New Equipment on page* 86)

Slam it shut!





Cutaway view of lower end of the XS Fuse tube showing how fuse link cable (1) holds cable flipper (2) against locking member (3) on ferrule (4). Through this lever system, the fuse link receives only 1/30 of the downward thrust on the fuse tube. Note flipper-actuating torsion spring (5).

S & C's XS Cutout doesn't break the fuse link

It's standard practice for the lineman to slam the fuse tube into the upper contact. There's always a chance that he may be closing in on a fault, so a decisive thrust is required. But when the fuse tube slams into place, the thrust is transferred downward, tending to collapse the toggle and break the fuse link.

S&C's Type XS Cutout has been designed to prevent such link breakage. Instead of using the fuse link itself to restrain the toggle, the XS Cutout uses the cable *flipper* (see illustration, left) to *lock* the toggle in place until the fuse link melts. Yet this locking action in no way impairs the high-speed flip-out of the link cable during circuit interruption. The flipper, powered by a husky torsion spring, insures split-second terminal separation.

The XS Cutout can be used with LOADBUSTER®, S&C's Portable Loadbreak Tool, permitting full load switching with the cutout at no extra cost. For full information, write for Descriptive Bulletin 511, S&C Electric Company, 4421 Ravenswood Ave., Chicago 40, Ill. In Canada: S&C Electric Canada, Ltd., 8 Vansco Road, Toronto 14, Ontario.

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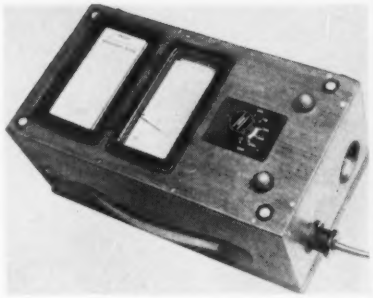

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MANUFACTURERS LITERATURE

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(Requests are made from code numbers on page 102).

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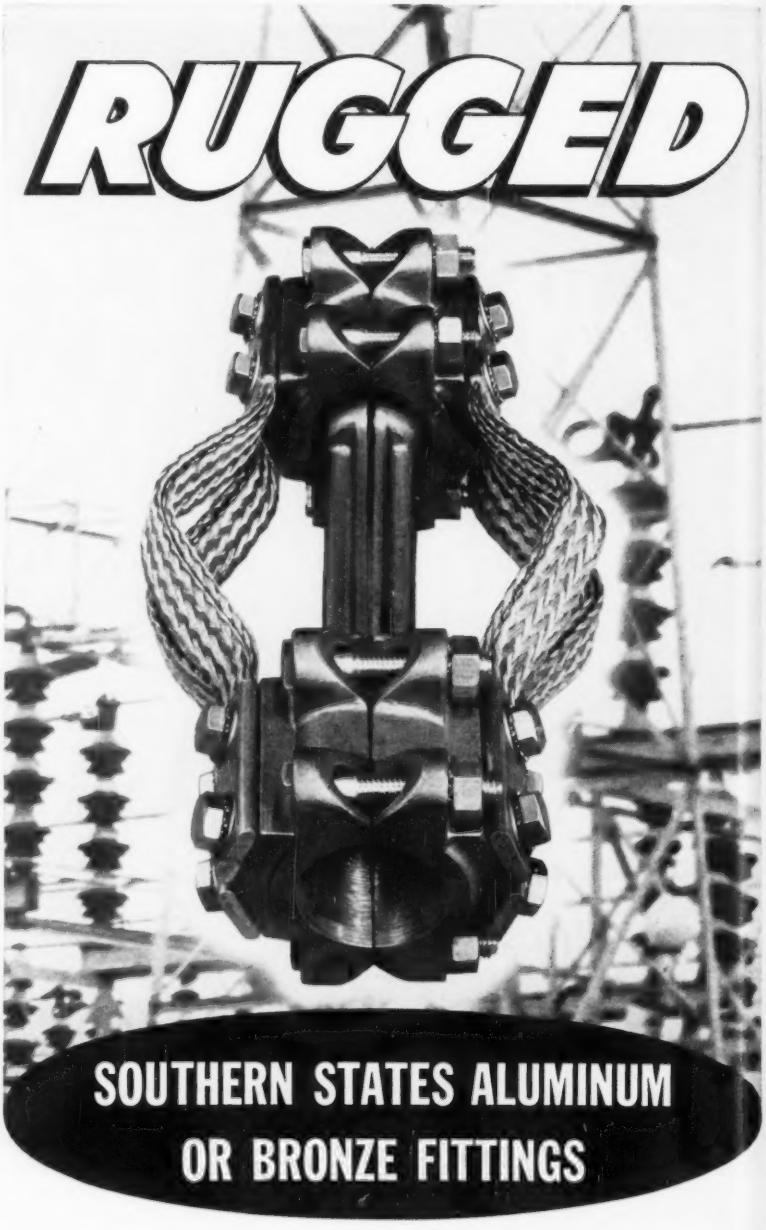

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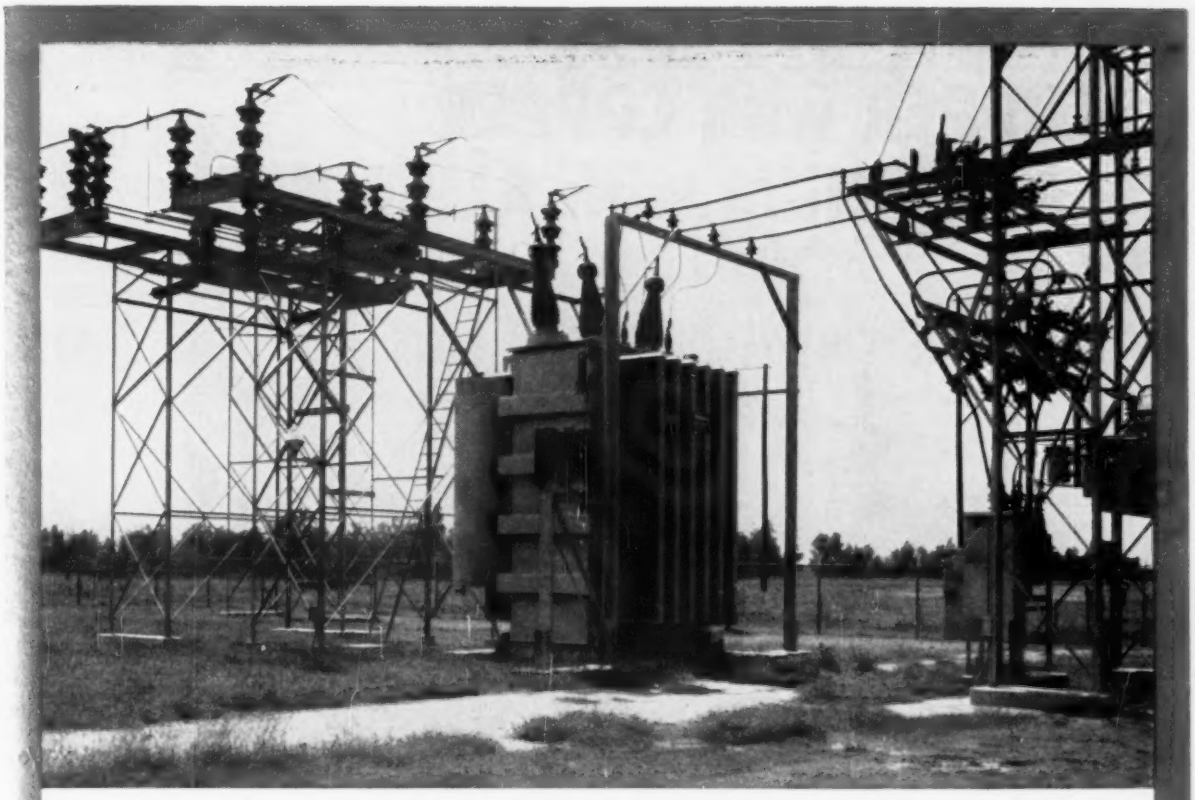

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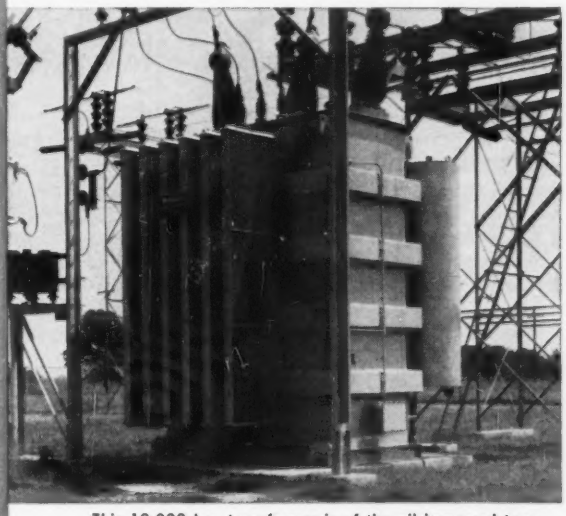

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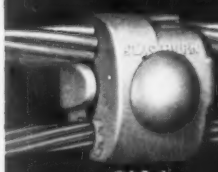

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California PUC Hears Arguments on Liberalized Depreciation

Report on
Rates and Regulation

A battle which may have nationwide repercussions in the utility industry has been raging since last September in a decorous California hearing room. Antagonists are the State of California and the state's utilities. Referee is the influential California Public Utilities Commission. Bone of contention is Section 167 of the Internal Revenue Code of 1954, on liberalized depreciation.

The state, in the person of Attorney General (now Governor) Edmund G. Brown, filed a petition to the effect that whether or not utilities "took" liberalized depreciation, it would be deemed for rate-making purposes that they had done so. Concurrently, the state claimed that, since the provisions of Section 167 permanently reduced taxes, only actual taxes could be used for rate making —and hence normalization was ruled out. (EW, Nov. 3, 1958, p 95).

Southern California Edison Co offered five alternatives:

1. "Book" the amount of taxes deferred as an expense which would reduce net income and require higher rates.
2. Allow actual taxes for rate making.
3. Normalize taxes but deduct the reserve.
4. Normalize taxes but give proper recognition to the interest-free features of the reserve.
5. Normalize taxes and include the whole reserve in the rate base.

So Cal Ed recommended the fourth method. E. R. Peterson, financial vice president, urged the PUC to ". . . permit the tax deferral, but for the regulatory commission to take into account the indirect methods which are effected by such tax deferrals in connection with its analysis of cost of money and the exercise of its judgment as to the appropriate weight to be given to such effects in determining a fair and just rate of return."

Peterson continued: "In my judgment, this is a sound and proper alternative which a regulatory commission could reasonably adopt for rate making purposes, for the reason that it permits the utility to utilize the funds from such tax deferrals as was intended by Congress, and it also permits appropriate recognition to be given to a fair sharing by the utility and its customers of the indirect benefits which accrue from the use of such funds.

"These indirect benefits are two-fold. First, a benefit is derived by the fact that the company would be required to raise less money from external sources

and consequently, its total annual dollar cost for its external funds should be less. Second, it is believed that because of the fact that it is raising less money than otherwise would be required, its securities should sell at a better price, that is, at a lower annual cost.

"I want to make it very clear, however, that such an alternative, if it is to be fairly applied, would require that appropriate recognition be given to the fact that with respect to the funds arising from tax deferrals, the utility and its stockholders are undertaking an increased risk and obligation that in fairness should be given adequate weight in such determinations. The risk and obligations involved are those of investing those funds wisely and maintaining the ability to meet the obligations which it must be anticipated will accrue with respect to each year's additions in the periods when the taxes with respect to such properties are higher because of the use of accelerated amortization and accelerated depreciation.

". . . That the tax deferrals are interest-free does not mean they are risk-free from the standpoint of the utility," Peterson went on. "In fact, the imposition ahead of the common stock equity of such tax obligations in the amount of, say $100 million, increases the risk of common stock equity in much the same way as would the issuance of $100 million of senior securities such as bonds or debentures.

"There, of course, may be many ways to reflect this increased risk in any cost of money analysis. One possible way in which such calculation might be made would be to include the tax deferrals in the computations at zero interest factor and to make an appropriate upward adjustment in the earnings requirement for the common stock equity."

What if the PUC ordered the use of actual taxes? What would be the company's position then? the witness was asked. Peterson answered: "I do not believe that our company, because of the risks involved, could be expected prudently to elect to utilize the accelerated depreciation options, with the result that the tax . . . would remain the same and the [present ratepayers] would not gain any temporary windfall through reduced rates at the expense of future ratepayers. On the other hand, the company would be required to raise substantially larger amounts of outside money for its construction program, which would result in increased financing costs that would have to be covered by rates."

Deputy Attorney-General Bennett succeeded in having the commission strike from the record Peterson's testimony on Congressional intent—on the ground that he (Peterson) was not a lawyer and was therefore incapable of interpreting it. Thus Bennett averted the admission of a strong and simple piece of evidence in favor of normalization. In his cross examination, the deputy attorney-general next attempted to make the witness admit that even if the PUC granted So Cal Ed the right to normalize taxes, the company would still have to come to the commission for rate increases. The colloquy ran like this:

Q. This reserve account, aren't you putting these moneys in a bank account for future taxes? **A.** No.

Q. What are you doing with this money? **A.** Investing it in plant.

Q. I see. In other words, the money you are taking from the rate payers you are putting into plant expansion? **A.** That is right.

Q. And there is no such thing as a specific earmarked bank account . . . being built up for payment of the tax bill when the man comes around? **A.** No, sir.

Q. Well, now, going back to this concept of the right of the utility (which we subscribe to) to ask for actual taxes in the form of rates from the rate payers, is there any reason why you won't in 1970 or 1980, whenever this occurs, come to the commission and ask at that time for increased rates for taxes and in the meantime the reserve is in plant? **A.** No, that would depend entirely upon our financial situation at that time. . . .

Q. Now, where, when the tax liability falls due in the undetermined future, if ever, are you going to get the hard dollars to pay taxes? **A.** We generate internally [a] considerable amount of money through non-cash expenses and the situation as it exists at the time these taxes become due determines whether or not we have to borrow money available to pay them. We have no way of predicting that.

Bennett's apparent aim was to make it look as if So Cal Ed were doing something wrong by not having a cash reserve. It is interesting to note, however, that his questions indicate an awareness that taxes will increase—which is contrary to the state's previous position that the tax reduction is permanent.

Another line of attack was to show that consumers were in effect financing the company's expansion. With respect to the $11 million which So Cal Ed has in a tax reserve for accelerated amortization, the questioning went like this:

Q. Well, now, aren't you actually taking the $11 million from the rate payer and then charging him 6% interest on his own $11 million here? **A.** We are taking the $11 million?

Q. Where does it come from? **A.** It comes through rates.

Q. From the rate payer? **A.** Through rates.

Q. Where does it go? **A.** Goes into plant.

Q. Becomes part of the rate base? **A.** Becomes part of the rate base.

Q. What is your rate of return, about 6% or what? **A.** Actually, right around 6%.

Q. Now, to get to your return, do you multiply this 6% times your rate base, of which this $11 million is a part? **A.** To get the return you multiply the rate base by the rate of return.

Q. In other words, you are taking $11 million from the consumers, you are putting it into your rate base, and upon his dollars you are charging him 6%. Isn't that so? **A.** I believe so. [This practise, incidentally, received circuit court sanction in the Panhandle Case.]

On the subject of inflation, Bennett first made Peterson admit that costs of operation have increased since 1945. He then proceeded:

Q. Now, in line with this principle which you have agreed to, why isn't it just as sound to extract from 1958 rate payers sufficient moneys to pay for 1968 labor costs, advertising costs, and any other costs your companies have on the expectation they are going to be greater in the future than they are today? **A.** We spent a great deal of time in the first rate case trying to get the California commission to permit that, but we were unsuccessful.

Q. All right. In other words is it your company policy to extract from 1958 rate payers as much today as possible for debts or obligations that are going to accrue at some undetermined date in the future? **A.** I think I can say that our policy is that we feel that the present rate payer should be paying . . . the full costs of the service that he is getting.

Q. Yes, actual costs. **A.** Actual and expected costs.

Q. And you say you have tried to persuade this commission to your way of thinking. Is it your point of view that 1958 consumers should finance the obligations of 1968 consumers as to costs in general? **A.** No, but the point that we are trying to make was that *there should be some allowance in the rate of return for the fact that the current rate payers were using property which would cost a good deal more to replace.* (Italics supplied.) The depreciation expense permitted by the commission is based on a historical cost concept, as was a rate of return.

Another witness on behalf of Southern California Edison was Alfred L. Burke, executive vice president of Duff & Phelps, Public Utility Security Analysts. Burke tried to introduce evidence wherein his firm commented on the decision of the Pennsylvania PUC in not allowing tax normalization. One of Duff &

Phelps' bulletins had made the statement that the Pennsylvania commission was misinformed about its being the first commission to rule on the rate-making treatment of liberalized depreciation.

Bennett objected in these words: "Mr. Commissioner, I am compelled to object to this layman's telling us that the Pennsylvania commission is misinformed, according to his records. This is the most self-serving testimony we have yet heard. This man is not a lawyer. He is telling us what the interpretation was of a court decision, and he is not qualified to do so. He is an investment analyst. He is not a lawyer." This objection was sustained by the commission.

Burke also tried to introduce evidence of changes in price-earnings ratios of certain Pennsylvania utility stocks before and after the PUC's adverse ruling on liberalized depreciation. Bennett objected on the ground that this was irrelevant. ". . . Who can tell what influences the price of stock?" the deputy attorney-general asked.

In cross-examining Burke, Bennett attempted to show that the customers were contributing to the capital requirements of the utility. The following discussion ensued:

Q. Now, Mr. Burke, you are taking this $10 million and using it for capital requirements of the company accorded to your plant. Is that correct? **A.** I am using it to build plant and avoiding having to go out on the market and raise another $10 million capital requirement.

Q. In other words, this $10 million is in lieu of capital that otherwise would be required to be raised? **A.** That's correct.

Q. So that this becomes a capital contribution from the consumer.

Mr Woodbury (counsel for So Cal Ed): I object to that.

Commissioner Untereiner: That remark will be stricken.

Bennett: I think I am entitled to ask this expert witness about it, Mr. Examiner—rather, Mr. Commissioner.

Untereiner: You may ask him if it is, but you may not testify that it is, which you did.

Bennett: Is this a capital contribution by the consumers to the utility?

A. I wouldn't quite classify it as a capital contribution, no.

Q. Even though it goes into plant? **A.** It goes into plant, yes.

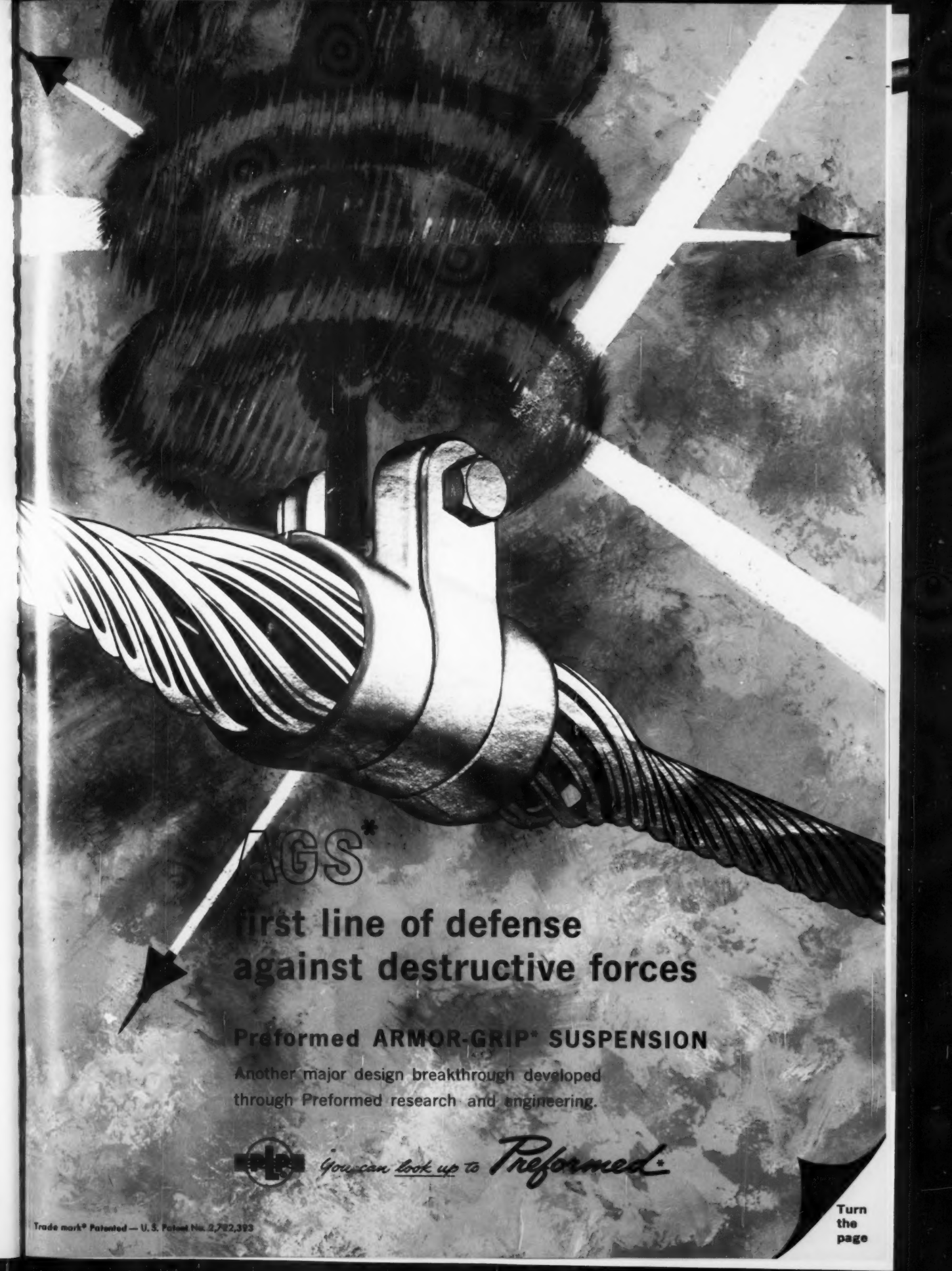
Q. How would you classify it if you were required to classify it in some account?

A. It is set up as a deferred tax reserve. You have assets and you have a corresponding liability on your balance sheet.

Q. From your knowledge as an investment analyst, is it your understanding that consumers can finance the capital expansion of the utility and make capital contributions? **A.** From the broadest sense, consumers are the only people that do finance a utility company, because it is only the rates that they pay which permit earnings to be declared; and if it were not for those earnings the capital could not be raised; so I think that you could say the consumers in the broad sense of the word furnish all of the capital of a utility company except that capital which represents retained earnings, which is a difference between balance for common and the dividends paid."

The California arguments will probably continue well into 1959 before a decision is reached. Both sides might well consider a recent statement by Everett H. Krueger, Chairman of the Ohio PUC: "It would seem to follow, however, that the practical effect of the regulatory application of this Actual Tax Method will be to preclude the election by utilities of accelerated depreciation. If such be the case, any benefits . . . would be lost to both rate payers and investors.

". . . It should be our objective as utility regulators," Krueger concluded, "to consider fully the efficacy of . . . giving effect to the expressed intent of Congress in the enactment of liberalized depreciation policies to the end that the rate treatment is fair and sound to both rate payers and utility investors."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AEP Names Thirteen to New Posts

NAGEL

McDANIEL

American Electric Power Service Corp has elected Paul W. Emler commercial vice president and John H. K. Shannahan assistant commercial vice president. The company has also organized the Commercial Department into three new divisions and promoted three executives to head the divisions. S. W. Andrews is the manager of the new Rate Division; John G. Howard will head the Industrial Sales Division; and John G. Snyder has been named head of the Residential and Commercial Sales Division.

In the Engineering Department, C. P. Zimmerman has been elected head of the Electrical Engineering Division, and H. C. Barnes is assistant division head; T. J. Nagel moves up to System Planning Division head, with C. A. Imburgia as assistant division head; and G. H. McDaniel is the new head of the System Operating Division.

E. A. Snyder, F. M. Porter and H. P. St. Clair have been made consultants to the company.

In his new capacity, Emler will direct the sale of electric power throughout the seven-state AEP system. He has been associated with AEP for 27 years, and was director of industrial power sales until 1957, when he was made assistant commercial vice president.

Stone & Webster Promotes Stone, Benjamin, Rempe

STONE

REMPE

BENJAMIN

Whitney Stone, president, has been named chairman of the board and chief executive officer of Stone & Webster, Inc. He succeeds William T. Crawford who has retired, but will continue as a director.

Richard N. Benjamin, former president of Stone & Webster Service Corp, has been made president and a director of Stone & Webster Inc. He was also elected chairman of the board of the Service Corp.

Peter J. Rempe has been named president of Stone & Webster Service Corp. He was formerly senior vice president.

Stone joined Stone & Webster Inc in 1930 as a vice president. He became president in 1945. Benjamin joined Stone & Webster Inc in 1927. He was secretary of Engineers Public Service Co, an S&W subsidiary, for 10 years. In 1947, he went with Stone & Webster Service Corp, and became vice president in 1948. He was elected president in 1953.

Rempe joined Stone & Webster Inc in 1928 and was elected a vice president of Stone & Webster Service Corp in 1939.

(*More News About People, p.* 100)

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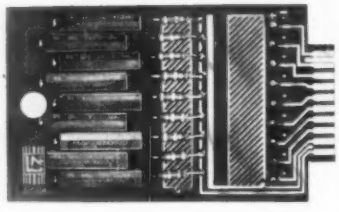

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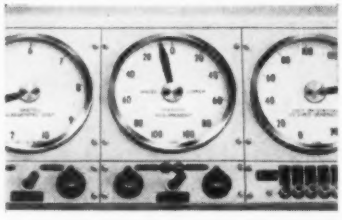
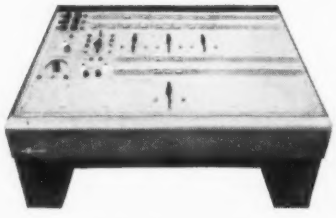
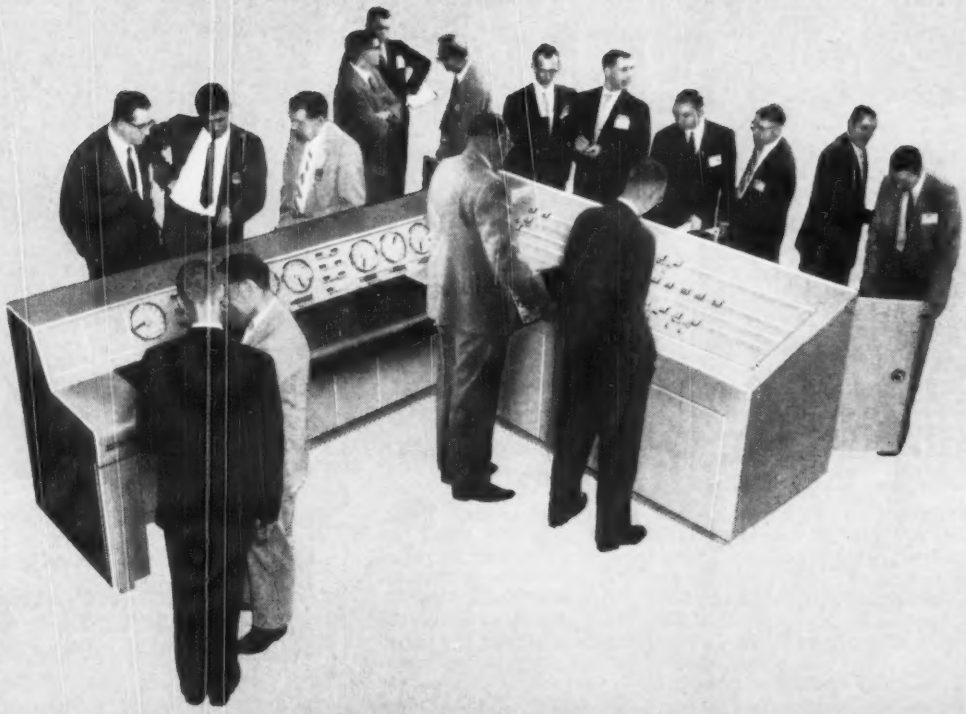


READOUTS: *For use with computer, these indicate cost of power at interconnection points, cost of delivered power, required generation change at each station when total system generation is changed by a given amount, desired generation (units and stations), total system generation, total system load, total steam generation and other, similar system data.*

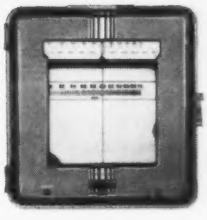


FLEXIBLE ECONOMY LOADING CONSOLE: *Used with or without computer, this console enables the Dispatcher to automatically load the system using precalculated loading schedules. When used with computer, the console serves to provide automatic loading during those periods of the day when adherence to a strict economy loading schedule is not feasible. It can also be used when the computer is off control during load studies, outages, etc.*

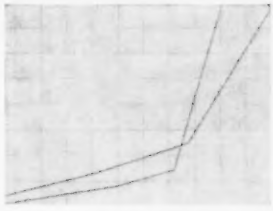


DUAL-FUNCTION *"desired generation"* **COMPUTER:** Dynamic analog device works both as control unit and independent load-study computer. Evaluates prevailing, rather than inferential, system data; makes lowest cost allocation of generation changes giving each unit a terminal destination. Utilizes transistorized function generators with adjustable intercepts and slopes. Can be equipped with a variety of readouts, setters, a transmission matrix and X-Y plotter. Accommodates any required number of sources.

HIGH SPEED, CONTINUOUS TYPE TELEMETERING: *Utilizes fast-response Thermal Converters and precision Speedomax G recorders to feed any desired system data to the dispatching center and generating stations. Can be used with or without transmitting-end recorder on microwave, carrier, or leased line channels. Quantities which can be telemetered include kw, rkva, kva, volts, weather data and a wide range of system information utilized by dispatching personnel.*



DUAL-RANGE FREQUENCY RECORDER: *±½-cycle and ±10-cycle ranges on the same wide strip chart. Normal operation is on the narrow range. Recorder automatically switches to wide range when frequency exceeds half-cycle limits.*



X-Y PLOTTER: *Used with computer to graphically record solutions to load study problems. Can be mounted integral with computer console or on a separate, movable table.*

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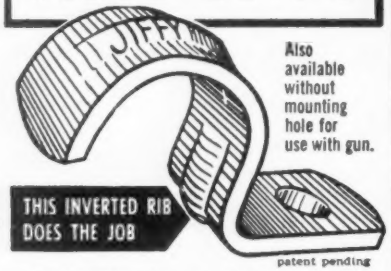
Heavy Duty AND Medium
JIFFY CLIPS



Also available without mounting hole for use with gun.

patent pending

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In stock in Zinc-Plated Steel for Thin Wall or Rigid Conduit up to 6". (Hot Dipped Galvanized may be obtained on order) Can be substituted for malleable clips.

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37 Wall St., New York, N. Y. WH 4-1812

Bush Appointed Senior Consultant for Ebasco

Richard M. Bush has been appointed a senior consultant on the Washington D. C. staff of Ebasco Services, Inc.

Prior to joining Ebasco, Bush spent 16 years with the U. S. Army Corp of Engineers, serving in Washington as chief of its Power Branch since 1955.

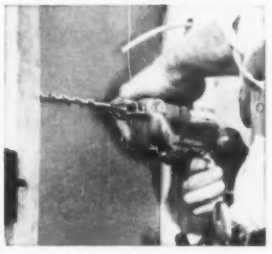
He has had 37 years experience in the electric power field. He joined Virginia Electric & Power Co in 1926 and remained with the company until 1942, except for two years as a division manager with Western Public Service Co.

Lewis Named President of Sylvania Electric

Robert E. Lewis has been named president of Sylvania Electric Products Inc. He succeeds Don G.

ONE BIT FITS BOTH

1. Hand Brace



2. Electric Drill

New Irwin Adapter Shank Wood Bit

Now you can eliminate the need to stock two types of wood auger bits. Irwin's new Adapter Shank Bit fits both hand braces and power drills.

With hand braces, use the Adapter Shank Bit as it comes. Cut off taper square and the Adapter Shank, with its 6 "hex flats", chucks perfectly in power drills or hand braces, either one. No wobble, no run-out. Clean, efficient cutting action. Reduces inventory and record keeping by 50%. Saves time on the job, too. Call your distributor, or write today for complete information. Sizes 4/16" to 17/16", both solid center and single twist types.

***All Irwin Adapter Shank Wood Bits** are forged in one piece from special steel and heat tempered full length for longer life. Plastic coating on balanced cutting heads guarantees factory-fresh sharpness, unequalled performance. Widely used by utilities, electricians and construction workers.*

IRWIN auger bits • screw drivers
Wilmington, Ohio

Mitchell who will continue as chairman of the board.

Lewis had been senior vice president of Sylvania. He was formerly with Argus Cameras, Inc, an independent company before its combination with Sylvania in 1957. He had served as its vice president and general manager, and president.

Prior to joining Argus, Lewis was a consulting management engineer with Sanderson & Porter, an engineering firm; treasurer and a director of American Steel & Wire Co; president of Cleveland Wire Spring Co; and controller and assistant to the president of Batten, Barton, Durstine and Osborn.

Kearney Joins EEI as Staff Assistant

John J. Kearney has joined Edison Electric Institute as staff assistant and secretary to the committee on Atomic power. He is the former assistant managing technical editor of Electrical World.

Before joining the magazine, Kearney was with Ebasco Services Inc, where he worked on the preparation of specifications for power plant equipment and supervising plant start-ups. Before that he taught mathematics at Notre Dame.

He is a member of the Atomic Industrial Forum, the Nuclear Energy Writers Assn, American Institute of Electrical Engineers, and American Society of Mechanical Engineers.

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S&R

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WIDENED THROAT

SAFETY LOCKING TYPE

This widened throat design is ideal for reconductoring, when new conductor is pulled through or old conductor is pulled out. Widened throat provides trouble-free passage for connector, compression joints, swivels and splices.

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Here's a book that gives you the creative tools you need for the analytical solution of any electrical measurement problem. Avoids unnecessary physical detail to focus on concepts and analysis in: errors of measurement, and their statistical treatment—methods of measurement—techniques of analysis—theory and operation of certain instruments—bridge analysis, and much more. **By Ernest Frank, Executive Officer, Dept. of Electrical Engineering, The George Washington U. 443 pp., 244 illus., $8.75.**

STEAM TURBINE PERFORMANCE AND ECONOMICS—*Just Published*

Here is a guidebook and reference on calculating steam-power-plant performance and its applications in preparing economic studies. Includes practical helps for the power-plant designer in selecting large turbines to meet specific needs . . . preparing turbine heat balances . . . estimating comparative performance data. Performance characteristics are given in graph form, with methods and background material also provided. **By R. L. Bartlett, Large Steam Turbine-Generator Dept., General Electric Co. 308 pp., 182 illus., $12.50.**

ELECTRICAL CONSTRUCTION COST MANUAL

This practical guide shows you how to get accurate cost estimates of electrical construction work—fully explains what you should do to bring all the vital cost factors of a job together in an integrated cost system. Step by step it establishes methods for installing work in various types of construction, develops standard assemblies for these conditions, sets up material and labor unit costs for each assembly, and gives a detailed estimating procedure for applying the unit costs. **By R. E. Johnson, President, Sturgeon Electric Co., 427 pp., 226 illus., $10.00.**

6 books in one!

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Manufacturers Literature

To request literature, use code numbers indicated for each item when filling in Reader Service form on page 88.

METAL SWITCHGEAR . . . 4160-v, 3000-amp continuous, 350-Mva IC, complete line of indoor and standard and walk-in outdoor types. Construction and performance features, ratings and dimensions given in 24-page Bulletin 2804-1A. I-T-E Circuit Breaker Co, 1900 Hamilton St. Philadelphia, Pa. D1

MOBILE SUBSTATIONS . . . in ratings through 10 Mva, 69 kv and below. Units include: transformer, high voltage switch, lightning arresters, fuses, and low voltage switchgear. For restoration of service in emergencies, also everyday maintenance, substations may have 2 or 3 high voltages and several low voltages connectable either delta or wye. Bulletin 61B9060. Allis-Chalmers, Milwaukee 1, Wis. D2

CONTROL CABLE . . . plastic insulated and packeted, 600 v. Specifications for small diameter, signal, supervisory, station, flexible control cables. Six-page folder. Chester Cable Corp, 153 Oakland Ave, Chester, N. Y. D3

SPLICING AND TERMINATING . . . rubber-insulated neoprene-jacketed power and control cables. Materials and procedures for operator to follow outlined. Booklet, 34 pages. Kaiser Aluminum & Chemical Sales, Inc., 919 N Michigan Ave, Chicago 11, Ill. D4

NEOPRENE POWER CABLES . . . Crescent Hyvolt, for installation in conduits, underground ducts, open air or direct burial in either wet or dry locations. Strand shielding under Hyvolt-Butyl insulation applied by vertical continuous vulcanization process. Engineering Specifications No. ES-105, Crescent Insulated Wire & Cable Co. Trenton, N. J. D5

"INSULATION TESTING BY D-C METHODS" . . . a technical treatise concerned with insulation maintenance of electrical apparatus. Tables, equations contained in chapters on tests, types of apparatus tested, test equipment requirements. D-c dielectric test set selection chart. 45 pages, $2.00 James G. Biddle Co, 1316 Arch St, Philadelphia 7, Pa. D6

D C HEAT EXCHANGER MOTOR for ratings from 25-300 hp, constructed in explosion-proof enclosure. Bulletin No. 3000. Louis Allis Co, Dept. P, 427 E. Stewart St., Milwaukee 1, Wis. D7

"QUINORGO AND QUINTERRA" . . . electrical insulation . . . Catalog sheets on types Quinorgo No. 3000 and No. 4000, Class B (for electrical equipment operating up to 130 C), also on Type 3 and 3-2 ply silicone-saturated, Class H Quinterra, Types 5 and 5-2 ply Quinterra Class B. Johns-Manville, 22 E 40 St, New York 16, N. Y. D8

OPEN-TYPE MOTORS, "Super-Seal", for applications previously requiring enclosed designs. Bulletin 05-51B9040, Allis-Chalmers, Milwaukee 1, Wis. D9

COMBINATION DUCT SYSTEMS and component parts, for low tension service. Catalog No. 758, 20 pages. Walker Bros, Conshohocken, Pa. D10

TIMING CONTROLS explosion-proof. Recycling, time delay, interval, elapsed time. For hazardous atmosphere. 8 pages. Industrial Timer Corp, 1407 McCarter Highway, Newark, N. J. D11

GE PUBLICATIONS: General Electric Co, Schenectady 5, N. Y.:

Industrial Motor Control Centers . . . in NEMA sizes 1-6. Bul. GEA-497 9D. 12 pages. D12

Transformers Mercury Arc Rectifier—Bulletin GEA-6845. 6 pages. D13

Mercury Arc Rectifiers, pumpless—Bulletin GEA-6848. 12 pages. D14

Selector Guide, Surface Heating . . . ratings for surface, platen heating, heat-up time. 4 pp. GE-6146B. D15

NEMA PUBLICATIONS: National Electrical Mfg. Assoc, 155 E. 44 St., New York 17, N. Y.:

Semiconductor Rectifier . . . Truck Battery Charger Units, 19 pages, price 40¢; Electroplating Units, 21 pages, price 40¢; Cathodic Protection Units, 17 pages, price 40¢; Selenium Cells and Stacks, 35 pages, price 50¢; Copper-oxide Cells and Stacks, 30 pages, price 50¢; Safety Code, 10 pages, 30¢. D16

Industrial Heating Units and Devices . . . HU 1-1958 gives voltage and wattage ratings, dielectric test, spacings, dimensions, terminations, and mounting holes. Price 30¢. D17

HIGH VOLTAGE CONTROLLERS used in street and highway lighting. Approved specifications. 8 pages. Edison Electric Inst., 750 Third Ave., New York 17, N. Y. D18

IEC VOCABULARY . . . Latest section of 2nd edition. Contains 90 terms and definitions in 8 languages. IEC Publication 50 (35). American Standards Assoc, Dept. PR23, 70 E. 45 St., New York 17, N. Y. D19

TRIANGLE TANDEM TRAVELER, used with conventional stringing blocks. Keystone Services, Inc., P.O. Box 7766, Denver 16, Colo. D20

Books

Primer on Water Power

Water Power Engineering. By Rolt Hammond. Published by Heywood & Co, Ltd, London, England. Distributed by The MacMillan Co, 60 Fifth Ave, New York 11, N. Y. 293 pages, illustrated. Price $10.00.

This small, five-chapter, book gives an excellent survey of the water power industry particularly outside of the United States. This book has value for the U. S. engineer who wishes a broad picture of this field as it discusses universal designs and problems.

The chapter headings are: The water power industry, water turbine design, electrical problems, hydroelectric developments, and tidal power.

Vacuum Tubes and Transistors

Vacuum-Tube and Semiconductor Electronics. By Jacob Millman. Published by McGraw-Hill Book Co, 330 W 42nd St, New York 36, N. Y. 632 pages, illustrated. Price $10.00.

The author intended this text for a first course in electronics at the undergraduate level. It is very timely because it has integrated the material on vacuum tubes and transistors for the first time, according to the publisher.

The author starts with a treatment of charged particles in fields, discusses metals and semiconductors, and then develops tube design and application in the usual manner. It is clearly written and well illustrated.

Books Recently Received

Basic Electricity, Second Edition. By P. B. Zbar. Published by McGraw-Hill Book Co, 330 West 42nd St, New York 36, N. Y. 97 pages, illustrated. Price $2.25.

Economic Operation of Power Systems. By L. K. Kirchmayer. Published by John Wiley & Sons, Inc, 440 Fourth Ave, New York 16, N. Y. 256 pages, illustrated. Price $12.00.

You and Management. By D. R. Davies and R. T. Livingston. Published by Harper & Brothers, 49 East 33rd St, New York 16, N. Y. 264 pages, illustrated. Price $4.50.

Productive Uses of Nuclear Energy. By C. J. Dwyer. Published by National Planning Association, 1606 New Hampshire Ave, N.W., Washington, D. C. 74 pages. Price $1.25.

Industrial Electronics Handbook. Edited by W. D. Cockrell. Published by McGraw-Hil Book Co, 330 West 42nd St, New York 36, N. Y. 1,408 pages, illustrated. Price $22.50.

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CHICAGO 11: 520 N. Michigan Ave.
SAN FRANCISCO 4: 68 Post St.

POSITION VACANT

Wanted—University graduate Engineer with at least five years experience operation steam electric generating station for responsible position in Maracaibo, Venezuela. Preference will be given Spanish speaking applicant. Salary dependent on qualifications. P-8320, Electrical World.

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P-9623 Electrical World
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OL-3-3334

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Appraisals—Investigations—Depreciation Studies—Cost Trends—Reports
for Rate Cases, Security Issues, Regulatory and Accounting Requirements
Original Cost and Continuing Property Record Determination
Ann Arbor, Michigan

THEODORE D. BROSS LINE CONSTRUCTION CORP.
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Distribution & Maintenance
175 Enfield St. Hartford, Conn.

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231 So. La Salle St. Chicago 4

COMMONWEALTH SERVICES INC.
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300 Park Ave
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ASSOCIATES INC.
Consulting and Design Engineers
209 E. Washington
Jackson, Michigan

SANBORN MAP COMPANY
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• Utility Area Base Maps
• Symbolized System Portrayal
Atlanta - New York - Chicago - San Francisco

ELECTRICAL TESTING LABORATORIES, INC.
Electrical, Electronic, Environmental, Photometric and Chemical Laboratories. Testing, Research, Inspection and Certification.
2 East End Ave. New York 21, N. Y.

SARGENT & LUNDY
Engineers
140 South Dearborn St.
Chicago, Ill.

HOOSIER ENGINEERING COMPANY
Erection and Maintenance of Electrical Transmission and Distribution Lines
1350 Holly Ave., Columbus 16, Ohio

TIPPETT & GEE
Consulting Engineers
Mechanical • Electrical • Thermodynamic
Structural Design • Studies • Supervision
Power Stations • Transmission • Distribution
Industrial Plants • Process
1333 North Second Street Abilene, Texas

Readers Forum

"Electric" or "Electrical"

To the Editors:

What is the policy of experts like yourselves in the matter of "electric" versus "electrical"? Do you have a handy rule as to which is used where, or do you just take aspirin and hope for the best?

If you cannot help me (Webster's Unabridged can't either) perhaps your readers would like to share their suggestions.

Frustrated Technical Translator
George C. Thornton
294 Roosevelt Square
Englewood, N. J.

We use "electric" utilities, but "electrical" manufacturers. We use "electric" bills, but "electrical" equipment. Our rule is to apply a keen ear and follow intuition. We, too, would welcome suggestions from readers.

Gas Light Poor, Costly

To the Editor:

Your editorial in the October 13, 1958 Electrical World "Stop Gas Light Fad" interested the writer, since we think that the gas industry has done an outstanding job in selling a poor light, an expensive light, and in some cases, a dangerous light, to the general public.

We would like to suggest that the electric utility industry, through the E.E.I. Merchandising Committee, get some manufacturers of yard lights to produce a light with a photo electric cell on it to control the turning on and off of the light. This is one of the big selling points of the gas light—that it requires no turning on and off of service. The 75 or 100 watt bulb could be of the 125 volt, heavy duty, so it could have extended life and be able to compete with the gas mantel.

Since the gas light is sold for fifty dollars installed, the program would have to be competitive.

It is really irksome to drive around in the various towns and see the installation of these obsolete gas mantel lights, which we have to remind us in the electrical industry that we were certainly asleep on a tremendous potential market for electric lighting.

P. T. Baird
Operations Superintendent
Consumers Public Power District
Lincoln 1, Nebraska

How to Handle "Hot"

To the Editor:

Chemists, physicists, and the rapidly growing group of people in the nuclear industry are using the term "HOT" to indicate radioactive substances or contaminated areas. In the electrical industry, "HOT" means electrically energized and has been so used by engineers, electricians, and power people generally for more than 50 years.

Language, of course, is free. But no one wants to be guilty of plagiarism—least of all those who are taking us into the nuclear age. This is as good a time as any to adopt or coin a word to designate radioactivity—some which will set it apart from the well-established electrical meaning.

We overwork the word "HOT", anyway, when using it for temperature, news, stolen goods, wars, novels, and peppery foods. Surely our nuclear friends can find an appropriate new term for radioactivity, such as acrid, toxic, radiant, or actinic.

Why not start a little contest for the word? First prize—one lead shielding block!

Carl T. Grauer
Electrical Engineer
Lawrence Radiation Laboratory
University of California
Livermore
188830 Sandy Road
Castro Valley, California

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NO-MELT INHIBITOR

CLEAR MARKING

BRIGHT COLOR CODING

SNAP CAPS

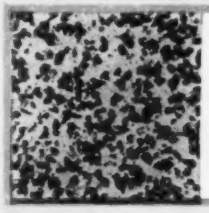
½" & ⅝" DIAMETERS

NOTHING MISSING IN THIS PICTURE

Reliable Aluminum Service *SQUEEZ* Sleeves give you everything — including an inhibitor compounded with granular additives in a no-melt petroleum base. Joints are sealed, excellent contacts induced by the additives are protected. The inhibitor compound has a temperature range of —10° to +600°F.; there is no melting point.

Write for the new Reliable SELECTABLE . . . the quick and easy way to select the sleeves you need for your conductor combinations.

Reliable Aluminum Service *SQUEEZ* Sleeves are unusually well marked, capped and color coded. Name, catalog number and die groove are clear. Inhibitor is in measured amount.



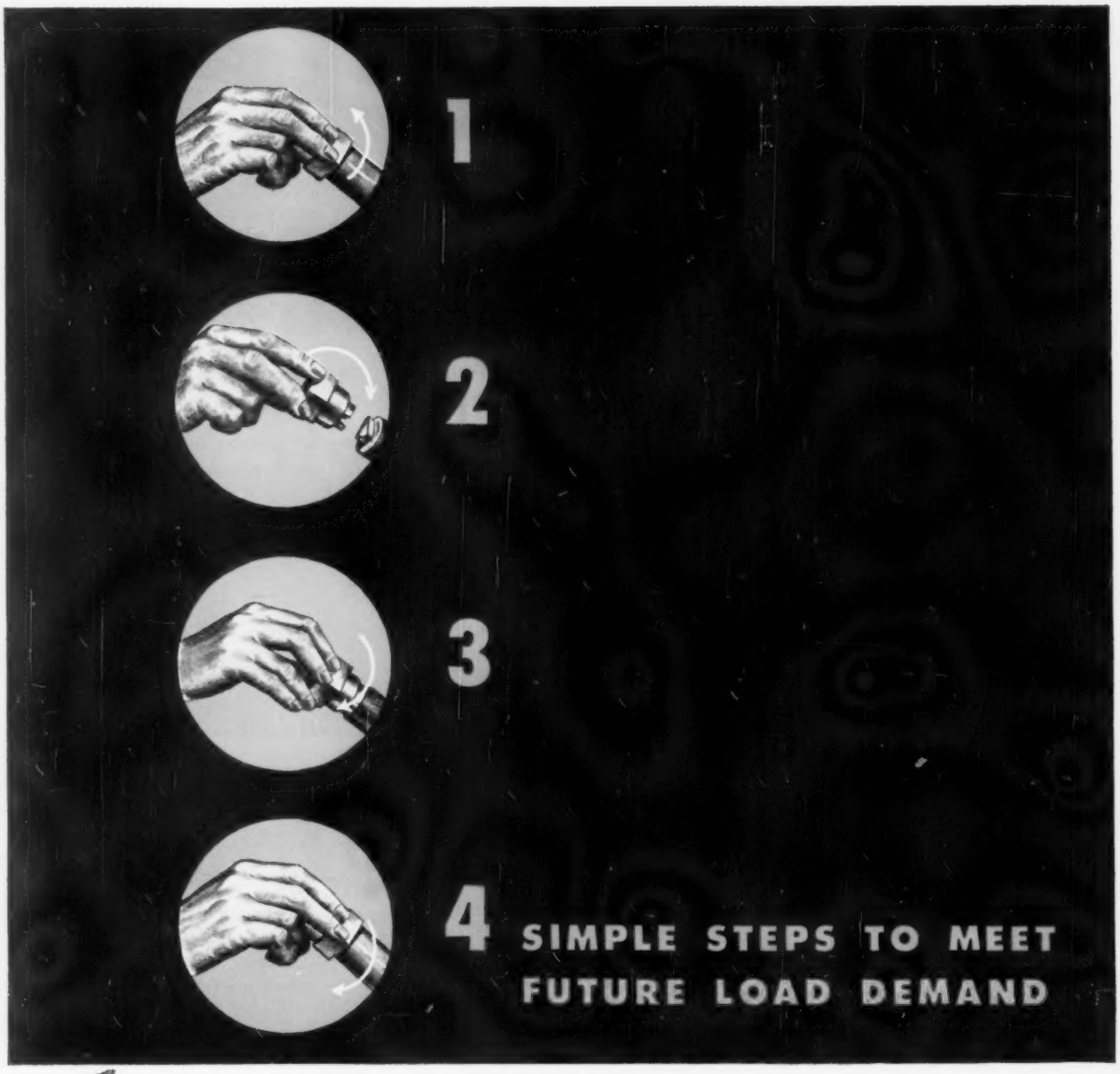
Magnified photo of Reliable's no-melt inhibitor shows contact inducing additives suspended in contact preserving silicone thickened base.

½" and ⅝" sleeves use standard "X" and "Y" die grooves, or tested substitutes, for compressing.

A HALF CENTURY OF SERVICE TO THE UTILITIES

Reliable ELECTRIC COMPANY • FRANKLIN PARK, ILL.

In Canada: Hayes Steel Products, Ltd., Merritton, Ont.



To operate simply: 1. Unscrew cap. 2. Turn cap over. 3. Rotate switch to desired switch position which is clearly indicated. 4. Replace cap and screw tight.

with MOLONEY S-M

Many areas within utility systems will require higher distribution system voltages due to load growth in the foreseeable future. The problem of installing transformers of the proper voltage for today's needs and then later installing transformers with higher voltages is eliminated with Moloney's S-M Distribution Transformers. Moloney S-M Distribution Transformers are easily switched from one voltage to another by means of the externally operated series-multiple switch. ME 58-31

VOLTAGE RATINGS—2400/4160Y x 7200/12470, 4800/8320Y x 14400/24940 Grd.Y, 7200/12470 x 14400/24940 Grd.Y

MOLONEY ELECTRIC COMPANY

Manufacturers of Transformers for Utilities, Industry, and Electronic Applications

SALES OFFICES IN ALL PRINCIPAL CITIES

FACTORIES AT ST. LOUIS 20, MO., AND TORONTO, ONT., CANADA